

THE EFFECT OF TRAINING GRADE FOUR STUDENTS TO BE SENSITIVE
TO EXPOSITORY TEXT STRUCTURE AND TO USE TEXT HEADINGS TO
INCREASE THE QUANTITY AND ORGANIZATION OF WRITTEN RECALL

by

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B.Ed., The University Of British Columbia, 1979

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF ARTS

in

THE FACULTY OF GRADUATE STUDIES
Department of Language Education

We accept this thesis as conforming
to the required standard

THE UNIVERSITY OF BRITISH COLUMBIA

AUGUST 1986

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ABSTRACT

The effects of training fourth grade students to be sensitive to the structure of information/classification prose and to use headings as information retrieval and organizational aids on the quantity and organization of written recall was investigated. One hundred and forty-one students from six intact non-streamed classes were involved in the study. The six classes were paired on the basis of estimated reading ability and socio-economic status and were randomly assigned to either an experimental or conventional instruction group. The experimental group received instruction from the investigator in the organization of information/classification prose and in the use of headings as recall aids for information/classification passages written at a low readability level. The conventional group received instruction from the classroom teachers to answer and orally mark answers to questions after reading the same passages as used with the experimental group. Results indicated that the experimental group training procedures significantly enhanced students' organization of written recall but did not facilitate an increase in the number of ideas recalled. Possible explanations for these findings, implications for classroom instruction, and suggestions for further research are discussed.

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ACKNOWLEDGEMENTS

I wish to take this opportunity to express my heartfelt gratitude to my senior advisor, Dr. Florence Pieronek, for believing in me, and providing me with continual encouragement, support and the opportunity to grow in my professional development.

Sincere thanks to Dr. Claire Staab for her excellent advice, guidance, time and encouragement.

Dr. Harold Ratzlaff must also be acknowledged for providing direction in analyzing and reporting the results of the study.

Special thanks to Dr. Catterson for her suggestions and advice for development of the instructional lessons and to Dr. Lee Gunderson for his help in the computer analysis of the data.

Sincere appreciation is extended to Jo-Anne Goble whose commitment to excellence was a great source of inspiration. Our partnership while conducting our parallel studies provided me with invaluable learning experiences about myself and about what is desirable and possible in education.

A note of thanks is also extended to the principals, teachers and students of the schools in which this study was conducted.

Finally, I am most grateful to my mother for her constant unconditional love, encouragement, friendship and commitment to my well-being and personal and professional development. Her support and caring has made it all possible.

CHAPTER ONE

THE PROBLEM

Statement of the Problem

This study was designed to investigate the effects of sensitizing elementary students to text structure and of training students to use headings for recall of information/classification expository passages. The target population was fourth grade students within self contained classrooms.

The basic premise of this investigation is that, for many students, recall of expository prose is hampered by lack of awareness of how expository text is structured and how headings can be used to facilitate recall of expository material. It was proposed that students will possibly be more able to comprehend and recall ideas in information/classification expository passages if they are sensitized to the structure of information/classification passages and if they are trained to utilize headings to gather information from the text.

Rationale for the Study

Beginning at about the fourth grade level students are required to read increasingly greater amounts of expository material (Durkin, 1978-79; Ekwall and Shanker, 1985). They are also required to recall greater amounts of what they read. As affirmed by Brown, Campione and Day (1981), "recall of [text] information is often demanded in schools -- both verbatim recall as in vocabulary tests and gist recall as when the student is required to reconstruct the essential meaning of a text" (p. 16). Several researchers have pointed out that many children experience difficulty comprehending and remembering expository prose information (Danner, 1976; Baumann, 1981; Taylor, 1982; Taylor and Beach, 1984).

There seem to be a number of factors which contribute to childrens' difficulty with recall of expository discourse. One aspect of prose which presents children with considerable difficulty is related to the actual structure and organization of the material. Unlike narrative material the content of expository prose is organized according to a hierarchical pattern of macropropositions (main ideas) and micropropositions (details) (Taylor, 1982).

Research focused on text structure seems to indicate that comprehension and memory for the information in

expository prose is enhanced when students are aware of how expository prose is structured (Elliott, 1980; Englert and Hiebert, 1984; McGee, 1982; Meyer, Brandt and Bluth, 1980; Taylor, 1980; Taylor, 1982). However, this research also indicates that many students demonstrate minimal awareness of the organizational structures in expository material (Englert and Hiebert, 1984; Meyer, Brandt, Bluth, 1980; Taylor, 1980). For this reason educators have expressed the need for instructional studies that explore ways to sensitize students to text structure (Englert and Hiebert, 1984; Taylor, 1982).

One possible way to sensitize students to text organization and to increase the quantity and organization of recall may be through instruction in the use of headings (Brown, Campione and Day, 1981; Christensen and Stordahl 1955; Gibbs, 1985; Herber, 1965, 1970; Jewitt, 1965; King, 1985; Niles, 1965; Robinson and Hall, 1941; Stables, 1985). Many educators seem to agree that efficient use of headings facilitates the identification, encoding and recall of ideas in a text (Brooks, Dansereau, Spurlin and Holley, 1983; Brown, Campione and Day 1981; Christensen and Stordahl, 1955; Herber, 1965, 1970; Jewitt, 1965; Niles, 1956; Meyer, 1984; Robinson, 1970; Robinson and Hall, 1941). As pointed out by Meyer (1984), "... subtitles [or headings] can be employed to focus on the macropropositions and explicitly signal the top-level structure of the text" (p. 133).

Past research on the effects of headings on recall has focused on several issues which include: the presence or absence of headings (Robinson and Hall, 1941; Stables, 1985); the effect of headings on immediate and long term recall (Brooks, Dansereau, Spurlin and Holley, 1983; Christensen and Stordahl, 1955; Dee-Lucas and Di Vesta, 1980; Doctorow, Wittrock, and Marks, 1978; Hartley and Trueman, 1983; Hartley, Kenely, Owen, and Trueman, 1980; Robinson and Hall, 1941); the effects of headings on students of differing reading abilities (Hartley and Trueman, 1983; Hartley, Kenely, Owen and Trueman, 1980; Stables, 1985); the effects on recall of instructing students to use headings (Brooks, Dansereau, Spurlin and Holley, 1983; Holley, Dansereau, Evans, Collins, Brooks and Larson, 1981) and to generate headings (Dee-Lucas and Di Vesta, 1980); and the effects of training students to use headings for identification and recall of the macrostructure in expository material (Taylor, 1982).

Overall, the investigations reveal that awareness of the utility of headings is vital if their presence is to influence the quantity and organization of recall (Robinson and Hall, 1941; Christensen and Stordahl, 1955; Gibbs, 1985; King, 1985; Stables, 1985). However, as with the studies focused on text structure, those investigations focused on intermediate students' use of headings seem to indicate a general lack of awareness of the utility of these structural cues (Stables, 1985). A number of

explanations for children's lack of sensitivity to text structure and to headings have been suggested: limited exposure to expository material (Stables, 1985; Taylor, 1982); developmental trends related to age and cognitive development (Danner, 1976; Englert and Hiebert, 1984; McGee, 1982; Meyer, Brandt and Bluth, 1980; Taylor, 1980; Stables, 1985); and the possible need for direct instruction (Brooks, Dansereau, Spurlin, and Holley, 1983; Elliott, 1980; Englert and Hiebert, 1984; Stables, 1985; Taylor, 1980; Taylor, 1982; Taylor, 1984).

Many of the few studies that have examined the effect of training college, high school and elementary students to use headings and text structure have found significant main effects for direct instruction (Bartlett, 1978; Brooks, Dansereau, Spurlin and Holley, 1983; Glynn and Di Vesta, 1977; Taylor, 1982; Taylor and Beach, 1984; Robinson, 1941-45). As well there is evidence that generative processing affects comprehension and recall of expository material. When readers are stimulated to generate representations of the macrostructure of a text, recall seems to be facilitated (Alvermann, 1982; Dee-Lucas and Di Vesta, 1980; Doctorow, Whittrock and Marks, 1978; Taylor, 1980; Taylor and Beach, 1984).

However, the limited number of investigations that have examined the effect of training intermediate students have produced mixed results (Boothby and Alvermann, 1984; Doctorow, Wittrock and Marks, 1978; Taylor, 1982; Taylor

and Beach 1984).

Some studies have reported success in training intermediate students to use headings (Doctorow, Whittrock and Marks, 1978; Taylor, 1982, initial study) and text structure (Taylor, 1982 initial study) as measured by tasks of comprehension and recall. Others found that intermediate students' comprehension and recall was not significantly affected by instruction in the use of headings (Taylor, 1982 replication study) and text structure (Boothby and Alvermann, 1984; Taylor, 1982 replication study). Furthermore, only one researcher has approximated the focus of the present investigation. Taylor (1982) conducted two concurrently run investigations designed to examine the effects of instructing fifth grade students to summarize content area textbook material according to the structure of the text as highlighted by headings and subheadings. Although her first study yielded significant results, her replication study did not attain the same degree of success.

Finally, no studies prior to the present investigation seem to have examined the effects of training grade four students to be sensitive to text structure and to use headings to increase the quantity and organization of recall. Therefore, there seemed to be a need for a study which combined a direct instructional paradigm with a generative processing approach to determine the effect of training grade four students to be sensitive to the

structure of descriptive prose and to use headings to facilitate the quantity and organization of recall.

Purpose of the Study

The purpose of the study was to investigate the effects of training grade four students to:

1. identify and survey headings;
2. be sensitive to the hierarchical organization of information/classification expository passages;
3. use paragraph headings as cues to the organization of information/classification expository text passages;
4. use rememberances of headings as information retrieval and organizational aids when recalling ideas in information/classification expository material.

Specifically, this study sought answers to the following question:

Will direct instruction designed to train grade four students to be sensitive to the organization of information/classification prose and to use headings as recall aids affect the quantity and organization of written recall?

Null Hypotheses

The following null hypotheses were established for statistical evaluation:

Ho₁: For Quantity of Recall by Treatment

There will be no statistically significant difference between the treatment groups in their adjusted mean final-test performance on the quantity of delayed written recall.

Ho₂: For Quantity of Recall by Reading Ability

There will be no statistically significant effect for ability level on students adjusted mean final-test performance on the quantity of delayed written recall.

Ho₃: For Interaction of Treatment by Reading Ability on the Quantity of Recall

There will be no interaction between student membership in both independent variable populations (treatment and reading ability) and their adjusted mean final-test performance on the quantity of delayed written recall.

Ho₄: For Organization of Recall by Treatment

There will be no statistically significant difference between the treatment groups in their adjusted mean final-test performance on the organization of delayed written recall.

Ho₅: For Organization of Recall by Ability

There will be no statistically significant effect for ability level on students adjusted mean final-test performance on the organization of delayed written recall.

Ho₆: For Interaction of Treatment by Reading Ability on the Organization of Recall

There will be no interaction between student membership in both independent variable populations (treatment and reading ability) and their adjusted mean final-test performance on the organization of delayed written recall.

Definition of Terms

The following terms are important for the understanding of this study.

Delayed Recall: For the purpose of this study, delayed recall is written free-recall one day after exposure to target material.

Generation: For the purpose of this study, generation refers to the act of producing or generating macropropositions for headings which lack the macropropositions of a paragraph.

Heading: For the purpose of this study, a heading is a word or phrase, set apart and above a paragraph, which reflects an explicit or implicit macroproposition of the paragraph (adapted from Stables, 1985).

Descriptive: (Also referred to as Information/Classification Text Structure). A style of expository material which organizes and presents information on the attributes, specifics, explanations or settings of a particular topic (adapted from Meyer, 1984).

Macroproposition: A statement of the main idea of a paragraph; a statement which subsumes details or micropropositions (adapted from Kintsch and van Dijk, 1978).

Macrostructure: In text analysis, the explicit or implicit main idea or gist of the topic and organization of a passage. The macrostructure may be derived from the title, headings and macropropositions of the text (adapted from Kintsch and van Dijk, 1978).

Micropropositions: Details of a passage.

Micropropositions are related to and subsumed by explicit or implicit main ideas (adapted from Kintsch and van Dijk, 1978).

Organization of Recall: The quality of the arrangement of propositions (micro and macropropositions) produced on a test of delayed written recall. In this study, a weighted scoring procedure will be used to measure the arrangement of macro and micropropositions (see Scoring Procedures section of Chapter 3).

Quantity of Recall: The number of propositions (micro and macropropositions) recalled as evidenced by a test of delayed written recall (see Scoring Procedures section of Chapter 3).

Sensitization: For the purpose of this study, sensitization refers to:

1. the teaching procedures used to increase the learner's awareness response to text structure and headings.
2. awareness on the part of the learner as opposed to lack of awareness.

Structural Cues: Those elements which signal the referential connections between details and main ideas. The structural cues emphasized in this study are topical headings.

Training: Guided instructional procedures using sequential lessons and materials prepared by the investigators to induce learning (adapted from Harris and Hodges, 1981).

Assumptions

It was assumed that:

1. The tasks which were required of the students in this study had some relation to the types of tasks required of students in a school setting.
2. The initial and final test instruments used in this study provided an adequate method for assessing the quantity and organization of recall of expository prose.
3. A weighted recall test scoring system is an appropriate and reliable method for assessing the quantity and organization of written recall.

Significance of the Study

This investigation is seen as having practical significance for educators, students and publishers. The study adds to the knowledge base of content area research

by providing further insight into the expository text processing abilities of grade four students. Some light may be shed on whether grade four students' sensitivity to text structure and the ability to effectively use headings to recall information is developmental or can be significantly affected by direct instruction. The experimental instructional treatment which significantly affected the organization of students' recall can be suggested to classroom teachers as one way of guiding students in processing, recalling and writing of expository material. Finally, the findings and materials of the study may be of use to publishers who wish to design content area resources which aid students in processing and recalling informational material.

Organization of the Thesis

The thesis is organized into five chapters. Chapter One presents the problem and rationale for the study. Chapter Two reviews the related literature. Chapter Three describes the design and methodology of the study. Chapter Four presents the results of the data analysis. Chapter Five includes a summary of the study and states the conclusions, limitations and implications for future research.

CHAPTER TWO

REVIEW OF THE LITERATURE

This review will focus on three areas of the literature. The first area, *The Importance of Sensitivity to Text Structure*, provides insight into why children may have greater difficulty comprehending and recalling expository prose than narrative material. A chronological review of studies that have focused on students' sensitivity to text structure reveals that awareness of the structure of expository prose may be an important determinant in children's ability to process expository material.

The second major area of the literature which concerns *The Effects of Headings on Recall and Comprehension of Expository Prose* has been divided into three subsections: a) The Importance of Teaching Students to use Headings, b) Theoretical Perspectives Regarding the Effectiveness of Headings, and c) Non-Instructional Exploratory Examinations of the Effects of Headings on Comprehension and Recall. The first subsection focuses on the opinions of several educators who seem to be in agreement that the use of headings may aid in conceptualizing the organizational structures of prose but that these cues to text structure may need to be taught. The second subsection outlines

theoretical perspectives which provide an understanding of how headings may affect processing and recall of expository prose. The third subsection reviews the findings of studies in which students were not trained to use headings thereby providing a perspective on students' natural tendencies to use these cues to text organization.

The final major area of the literature encompasses *Instructional Studies Designed to Sensitize Students to Headings, Text Structure and Macrostructure Formation*. A chronological review of these instructional studies provides insight into the types of tasks and training procedures that seem to help readers focus on ideas in expository prose which, in turn, facilitate comprehension and recall of information material.

The Importance of Sensitivity to Text Structure

A number of possible factors have been suggested for children's difficulty with comprehension and recall of expository prose. These include: lack of prior knowledge, differential language experiences, lack of interest or motivation, the inclusion of specialized vocabulary, heavy concept load, and high readability levels (Burns, Roe and Ross, 1984; Collins and Haviland 1979; Ekwall and Shanker, 1985; Englert and Hiebert, 1984; Taylor, 1982). However, the factors of concern to this investigation are related to children's apparent insensitivity to the organizational structure of expository prose and lack of strategic skills

which may be used to comprehend and recall such material (Englert and Hiebert, 1984; Taylor, 1982).

Unlike narrative prose, expository text may be constructed according to several patterns. Each pattern is comprised of a hierarchical organization of main ideas (macropropositions) and details (micropropositions) which form the gist or macrostructure of the text (Kintsh and Van Dijk, 1978; Meyer, 1984; Taylor, 1980). Narrative prose, on the other hand, is usually organized in a sequential manner, follows the conventions of story grammar and can be read from beginning to end (Bridge and Tierney 1981; Pieronek, 1985; Taylor, 1982).

There seems to be general agreement among reading practitioners, theorists, and researchers that sensitivity to the hierarchical patterns of expository prose is an important factor in the ability to comprehend and recall expository material (Englert and Hiebert, 1984; Catterson, 1985; Herber, 1970; Kintsch and van Dijk, 1978; McGee, 1982; Meyer, 1984; Meyer, Brandt and Bluth, 1980; Niles, 1965; Taylor, 1980; Taylor, 1982). For example, Catterson (1985) believes that students need to approach expository prose with a different mental framework than used for expository text. As put forth by Catterson (1966, 1985):

Reading narrative involves some of the same thought processes as reading information does but there are also many differences between the two processes and stressing the differences is probably more helpful than stressing similarities. One reads within a mind-set tripped by organization of the material (p. 4).

Pieronek (1985) concurs with the opinion of Catterson (1985) and suggests that children be taught the difference between narrative and information material.

Niles (1965) pointed out that "efficiency of recall depends in part upon the perceiving of some kind of order or system in the ideas to be recalled" (p. 57). She maintained that awareness of expository prose patterns enhances comprehension accuracy, recall efficiency, and the ability to weigh the importance of details in a text. Her informal analysis of content area texts (1965) revealed that four main organizational patterns were used in school textbooks in the following order of frequency: enumerative order (also known as simple listing, descriptive or information/classification), time order, cause-effect and compare-contrast.

Herber (1970) also agreed that awareness and use of the organization of prose enhances the reading of expository material. He identified two organization structures of expository text: external and internal. Internal organization refers to the structure or pattern of the text content whether it be main idea/detail, cause/effect, comparison/contrast, or disorganized in structure. Like Niles, Herber rationalized that students can use knowledge about the internal organizational structure of prose to distinguish between important and unimportant information. External organization focuses on the format and physical features of the text such as tables

of contents, chapter headings, underlinings or italics, maps, pictures, etc. He reasoned that external organizers can be used by students "to decipher what priorities authors place on ideas and information and to identify the nature of the content present in the text".

The importance of approaching prose with a schema for its inherent organization and content has been suggested in Kintsch and van Dijk's (1978) model of text comprehension and reproduction. According to this frequently cited model the capacity limitations of the human mind make it impossible to remember everything in a text. A reader must therefore form a gist or macrostructure of the important ideas to be recalled. To do this efficiently the reader must be sensitive to the macropropositions (main ideas) and micropropositions (details) in the selection. At the same time, the reader must be able to apply rules of deletion, generalization and construction when internalizing the main ideas and details into a macrostructure or mental gist. Rules of addition, specification and particularization must then be applied to transform the macrostructure back into a recalled version of the important concepts of the material. Kintsch and van Dijk theorized that propositions located high in the hierarchical organization would be more likely recalled than those low in the hierarchy. They also hypothesized that referentially connected propositions would be easier to recall because they could be processed in chunks. The theorists further postulated that

increasing the complexity of the text would most likely decrease the size of the processing chunks. However, the factors which play major roles in macrostructure formation are considered to be the reader's processing goals, the reader's schema for the information presented, and the reader's schema for the text pattern used to present the information.

Research has indicated that students who have a schema for the organizational structures of prose, or more simply put, students who are aware of the organization of ideas in expository prose remember significantly more of what they read than students who are not aware of text structure (Elliott, 1980; Englert and Hiebert, 1984; Meyer, Brandt and Bluth, 1980; Taylor, 1980; Taylor, 1982). Meyer, Brandt and Bluth (1980) conducted an investigation focused on ninth grade students' use of text organization. The study involved 102 ninth grade students divided into groups of good, average and poor reading abilities based on teacher estimates and reading test performance. Two passages, one with a comparison top level structure and one with a problem/solution pattern were used in the study. Each passage was written in two versions: a with-signalling version and a without-signalling version. The with-signalling version explicitly stated the top-level structure of the text, included a title and contained underlined words of the main concepts of the passage while the without-signalling version did not.

In the study each student was randomly assigned to two of the four passages and to a passage presentation order. After reading a passage, and removing it from sight, the participants wrote down everything they could remember. One week later the students again wrote down everything that could be remembered. Following the free recall task, each student completed a test requiring recognition ratings of sentences from the passages read one week previously.

Based on the data Meyer, Brandt and Bluth (1980) reported five major findings related to the ninth grade students' use of text structure. First, only 50% of the participants utilized the author's structure at least once when recalling information from the passage and only 22% used text structure consistently. Second, good ninth grade readers were more inclined to use text structure to organize their protocols than poor ninth grade readers. Third, those students who did use the author's structure recalled more information than those who did not. Fourth, students who used the top-level structure were more able to recognize whether information was consistent or inconsistent with the passages that had been read than those who did not use text structure. Fifth, although it appeared that signalling facilitated use of text structure, learning, and immediate recall of poor ninth grade students, this finding approached but did not reach significance.

Results from the study by Meyer, Brandt and Bluth showed that sensitivity to text structure may influence recall, that good readers seem more aware of text structure than poor readers and that greater amounts of cues which signal the text macrostructure may aid in recall of expository material.

Research on the effectiveness of mature reader's use of text structure and recall of expository prose sheds some light on students' text processing operations. However studies investigating children's discourse processing operations of prose have been limited. One of the earliest studies which investigated the effect of expository organization on children's recall was conducted by Aulls in 1975. Specifically, the study was designed to find out whether certain internal and external structural characteristics and content meaningfulness would have a significant joint effect on the free recall scores of sixth grade students. Internal characteristics of paragraphs such as sentence order (discontinuous or compact in organization), and external characteristics of paragraphs such as the presence of main idea statement and topic title, main idea statement only, topic title only, or neither, and meaningfulness of paragraph content were manipulated in a factorial arrangement design. One hundred and twenty eight students reading at or above the sixth grade level read two assigned paragraphs (grade 5 readability level) which varied in content meaningfulness.

The students were given just enough time to read each paragraph once. Then the participants were instructed to write down everything the paragraph had said word for word.

A summarization of the results indicated that recall was jointly influenced by the content meaningfulness of a paragraph and structural characteristics of a paragraph. For low meaningful paragraph content (discontinuous and disorganized) the title-main idea combination significantly increased recall and had a greater facilitative effect on recall than paragraphs where neither title nor main idea statement were present. However, for meaningful paragraph content (compact and organized), the topic title was not as influential on recall as was the main idea statement. Aulls suggested, however, that a longer time allotment might have allowed readers to find the structural cues which would indicate relationships between subtopics, idea statements or titles. Nonetheless, the main effects of the data do indicate that the content meaningfulness (internal organization) of expository prose paragraphs has joint influence with external structural characteristics in influencing recall. The findings also support the notion that paragraph structure may act as a guide that influences recall (Aulls, 1975).

Since paragraph structure may act as a guide which influences memory, further studies were needed to determine the extent to which prose organization and children's awareness of this organization influenced their recall.

One such study was conducted one year later by Danner (1976). The purpose of this study was to assess grades two, four and six children's understanding of topical organization in short descriptive passages, the influence of this organization on their recall, and their awareness of the effects of topical organization. The study utilized 12 girls and 12 boys from each grade. Danner had each student listen to two tape recorded 12 sentence passages. The two passages described a fox or polar bear. Each passage contained three main topics with four sentences to each topic. Both passages had two versions, one topically organized and the other topically disorganized. The passages were presented consecutively and the order of presentation was counterbalanced among participants. Immediately following the taped presentation each child was required to participate in a free recall test, a discussion of subjective recall difficulty, a detection task, a grouping task, a topic description task and a review notes task.

An analysis of the test data revealed that passage organization significantly affected the amount, order and perceived difficulty of recall in all students from all three grades. Recall and topical clustering of sentences was greater for topically organized passages. In addition, age related differences were found in the number of children who were aware of passage organization. A proportionately greater number of older children noticed

differences in the structure between passages, sorted sentences topically and selected review notes on the basis of passage organization. Only two students, one in grade four and one in grade six, demonstrated awareness of the utility of organization by spontaneously attributing greater difficulty when recalling ideas to differences in the organization of the disorganized passages.

Danner commented that although developmental trends may exist in children's awareness of the utility of text organization on memory, differences in ability may also be attributed to younger children's lack of exposure to instruction in topical outlining. Because passage organization influenced recall regardless of awareness of organization, Danner concluded that training in detection and use of text organization may facilitate students' performance in study and recall of expository materials.

Danner's study seemed to demonstrate that children's recall of descriptive expository passages increased with passage organization. The findings also seemed to indicate that awareness of the utility of passage organization increased with age. However, these findings were limited to children's memory for short, relatively simple passages which required a listening task rather than a reading activity.

In another study involving listening and the effect of content organization on recall, Waters (1978) found that propositions placed high in the hierarchical structure of a

passage were recalled better than those low in the hierarchical organization. In the first of two investigations, 64 third grade, 64 sixth grade and 96 college level students either generated a passage or listened to a tape recorded passage generated by a different participant. Subjects who generated a passage were given a set of "prompt" words in order to compose the material to be remembered. These same passages were then listened to by another group of subjects who were supplied the prompt sheet while listening. Two weeks later all subjects were asked to recall their passage.

The results of the study found that all subjects from both treatments recalled more superordinate (high level) than subordinate (low level) propositions. As well the results indicated that a subordinate proposition was more likely to be recalled when its superordinate proposition had been recalled. These findings provide support for Kintsch and van Dijk's (1978) model of text comprehension and production.

In contrast to Danner's findings (1976), Waters did not find developmental differences in sensitivity to text structure since younger students appeared as likely to recall superordinate propositions as older students. However, these findings seem best interpreted in light of the kinds of tasks which were performed during the study. First, results from an investigation in which students listened to or generated passages to be recalled cannot be

easily generalized to conditions in which students must read material for recall. Second, a closer look at the prompt word outlines revealed that the outline contained only 11 words, each of which could be connected in a sequential pattern similar to what might be found in a narrative rather than an expository passage. Since it is not known whether individuals constructed their passages in narrative form it is difficult to determine if the results can be generalized to recall of expository prose.

The studies conducted by Aulls (1975), Danner (1976) and Waters (1978) suggest that the organization of prose and sensitivity to this organization may affect comprehension and recall. These investigations also suggested that further research regarding the organizational aspects of prose was warranted. However there was a need for studies which examined children's ability to recall expository material after reading. This need was met by Tierney, Bridge and Cera (1978-79) who compared the extent and type of information recalled by good readers versus poor readers after reading expository material. Based on the results of standardized reading tests, teacher judgement and oral reading accuracy, 36 subjects, 18 good third grade readers and 18 poor third grade readers were selected for the study. All participants were required to orally read a 5 paragraph passage on dinosaurs, to complete a distractor reading task and to orally free-recall everything that could be remembered. Students were then probed for further recall.

The findings revealed that good readers recalled significantly more complete propositions, and more of the propositional structure and interpropositional structure than poor readers. A subjective analysis of the data revealed that, in several cases, the free recalls approximated a shortened version of the non-narrative passage or tended to follow a story grammar pattern of setting, theme, plot and resolution. Tierney, Bridge and Cera (1978-79) speculated that these students might have had a narrative schema or framework which may have guided abstraction of the non-narrative texts into narrative renditions. The experimenters suggested that children's discourse processing of expository prose seemed to be both constructive (text based) and abstractive (based according to the reader's prior knowledge and schemata of text structure).

Taylor (1980) also realized the need for studies which investigated children's ability to recall expository material after reading. Unlike past research, Taylor's investigation was designed to examine the relationship between reading ability, age, recall of expository text and sensitivity to text structure. The sample population included 17 good sixth grade readers, 17 poor sixth grade readers and 17 good fourth grade readers. Seventeen adult graduate students were also included in the study to provide an example of adult recall performance. Two 225

word passages containing identical information on animal protection were written at a fourth and sixth grade readability level. The sixth-grade passage was constructed for the sixth grade good readers and adults while the fourth grade passage was constructed for poor sixth-grade and good fourth grade readers. Both passages were written in attributive (descriptive) style. All subjects were required to silently read and then orally recall their assigned passage. The passage was again orally recalled after a two day delay.

The results of the study revealed a developmental trend in the children's recall ability after reading. Sixth grade readers produced more memories on immediate and delayed recall than fourth grade readers. As well, after a two day delay, sixth grade good readers were able to recall more than sixth grade poor readers or fourth grade good readers. Taylor (1980) suggested that the sixth grade good readers may have had better recall because they used text structure to order their recalls. She also suggested that differences in delayed recall scores may have been a result of following the passage organization even though the recalls did not contain top level structure.

The findings of Taylor's study also indicated that children's memory for expository prose is facilitated if they use the top-level pattern of the text to order their recalls. However it appeared that none of the children were particularly adept at following the text structure in

their delayed recalls. Only 59%, 18% and 12% of the sixth-grade good readers, sixth grade poor readers and fourth grade good readers, respectively, demonstrated sensitivity to text structure. Taylor suggests that the younger readers may have performed poorly on immediate and delayed recall because of difficulties with comprehension of expository text materials, lack of prior knowledge about the subject in the passage, less study skill strategies, less exposure to expository type materials and difficulties expressing themselves orally in the recall situation (p. 408).

Based on the findings of her study Taylor made several recommendations which included: instructing students to attend to top-level structure of expository material; conducting research in which elementary students are trained to organize their memories according to the top-level structure of the material; conducting research with elementary children using expository passages of different lengths and content to discover if there are any circumstances under which students more readily produce top-level structure patterns of prose; and conducting research to find instructional techniques which would enable children to become skilled at recognizing and utilizing expository text organization to enhance their reading-to-learn abilities.

At about the same time that Taylor was conducting her study on children's sensitivity to text structure, Elliott

(1980) was also exploring children's sensitivity to text structure. Specifically, Elliott attempted to determine what intermediate students knew about text organization and whether use of particular top-level structures would facilitate recall of expository prose. The study involved 102 sixth grade students. No students reading one year below grade level were included in the study. Two versions of a passage about loss of human body water were developed. One was written in the adversative (comparison/contrast) top-level structure and the other was written in an attributive (descriptive) pattern. Students were instructed to read one of the randomly assigned passage versions and after a 48 hour delay were required to produce a written recall protocol of the passage.

Elliott found that the differences in the amount of recall between the two passage versions was not statistically significant. However, it was found that the 44% of students who spontaneously used the author's structure to organize their written recalls remembered more than students who did not. Like Taylor (1980), Elliott concluded that students would benefit from training in the identification and use of text structure as a study strategy. Thus Elliott's study appears to support the notion that sensitivity to text structure enhances recall efficiency.

Further research related to the work of Tierney, Bridge and Cera (1978-79) and children's possible

differential processing of expository and narrative prose was conducted by Bridge and Tierney in 1981. The specific purpose of the study was to examine the effects on the amount and kind of explicit and inferred information in free and probed recalls of good and poor readers after reading an expository and a narrative passage. The participants included 18 good third-grade readers and 18 poor third grade readers selected on the basis of teacher judgement, standardized reading test scores (Stanford Achievement Text) and oral reading accuracy. The two test passages were selected from a basal reader. The narrative selection was a story called "Johnny and the Squirrel" and the expository selection was entitled "Dinosaurs". After orally reading both passages and recalling what could be remembered, students were probed for further information.

Results of Bridge and Tierney's (1981) investigation showed that the kind of material - narrative or expository prose - generally influenced the quantity and type of information recalled by good and poor readers. Both good and poor readers recalled a greater amount of explicitly stated information, generated more connectors, and were better able to preserve the original order of ideas in the narrative than in the expository passage. The findings related to ability revealed that good readers generally recalled more explicit information in their free recalls and generated more inferred information in the probed condition than poor readers. However, these general

findings regarding the influence of reading ability and text type were not consistently found for individual readers. Many students varied greatly in the amount and kind of information recalled after reading the two texts. This finding led the experimenters to conclude that it is unwise to predict individual's recall behavior from one text to another based on an individual's reading ability.

Another investigation that focused on good and poor readers' awareness of text structure was conducted one year later by McGee (1982). A total of 20 good readers from both the third and fifth grade and 20 poor readers from the fifth grade were selected for the study. All participants were randomly chosen from four elementary schools. The test materials were two 125 word descriptive style passages written at a grade three readability level containing similar three-level hierarchies and quantities of idea units. The students in this study were required to read a passage, complete a distractor addition problem and orally recall everything that could be remembered about the passage. The same procedure was used for each passage and oral recalls were tape recorded.

Results of McGee's (1982) investigation revealed that fifth grade good readers recalled more total ideas than poor fifth grade readers, who in turn recalled more ideas than third graders. The results also showed that good grade five readers had a greater awareness of text structure, fifth grade poor readers demonstrated some

sensitivity to text structure and third grade good readers demonstrated minimal sensitivity to text structure. However, even those students who followed the text structure while reading the short, tightly structured passage recalled less than 40% of the information in the material. As reported by McGee the results seem to suggest that awareness of text structure may be related to age and exposure to expository material. She also suggested the need for research which addressed the effects on recall of instructing students to use text structure.

Additional information on elementary student's awareness of different types of text structure is provided by data obtained by Englert and Hiebert in 1984. Specifically, Englert and Hiebert (1984) investigated children's knowledge of four commonly found patterns of expository prose which included description, enumeration, sequence and compare/contrast. Sixty-nine third graders and sixty-nine sixth graders differing in socio-economic status were involved in the study. Subjects were rank ordered and clustered into groups of high, medium and low ability readers on the basis of available reading achievement scores (California Test of Basic Skills). Each of the four passages used in the study contained six sentences and were written at a grade 2.5 readability (Dale Chall) level. The first four sentences followed a particular text structure and introduced and extended the topic idea. The last two sentences retained some of the

topical information previously introduced but intruded on the passage pattern by introducing a new text structure. After an explanation of the test sample problem and task requirements all students silently read the passages (the third grade children first had the passage read to them by an investigator) and rated how well each of the last four sentences belonged with the first two topical sentences. One of four responses could be marked with an "X": YES!; Yes? (sort of belongs); No!; and No? (sort of doesn't belong).

The results of this study revealed that knowledge of text structure was related to grade level and reading ability and that certain text structures were more salient than others. Specifically, those students who were more aware of text structure outperformed those who were not. This finding supports the results of past research conducted by Taylor (1980), Elliott (1980), McGee (1982) and Meyer, Brandt, and Bluth (1980). Another finding of the study was that sixth-grade students seemed generally more adept at detecting mismatches between the text structure and distractor sentences than the third grade students. Third grade students tended to rate all sentences as belonging to the paragraph. These findings were viewed as evidence for the existence of developmental differences reported in other studies (Danner, 1976; Taylor, 1980; McGee, 1982). The results of the experiment also indicated that children's saliency to text structure

seemed to proceed in the following sequence of awareness: sequence, enumeration, description and comparison/contrast. Englert and Hiebert (1984) viewed this as an interesting finding considering the fact that narrative texts generally follow a sequential order of events and descriptive text is the type most commonly found in elementary school texts. The investigators further suggested that

the sequence [pattern] may have constituted a powerful text structure because of young children's prior experience and familiarity with time-based structures in stories. Indeed, Freedle and Hale's (1979) suggestion that competence with story structure precedes competence with expository structure needs consideration (p. 12).

Englert and Hiebert's suggestions for children's difficulty with descriptive structures were that

description passages typically occur as short segments with other structures and often shift abruptly to accomodate other text structures (p. 72).

The experimenters concluded that there was a need for research which defines how best to facilitate student learning of text structure at particular stages of development.

Summary

The findings of the studies reviewed thus far have contributed to the understanding of how awareness of text structure affects text processing. A review of the main points is warranted. First, because the structure of

expository prose is different from that of narrative prose it may require different reading skills and strategies (Burns, Roe and Ross, 1984; Bridge and Tierney, 1981; Catterson, 1985; Collins and Haviland, 1979; Ekwall and Shanker, 1985; Englert and Hiebert, 1984; Meyer, 1984; Pieronek, 1985; Taylor, 1980, 1982). Second, the construction of an expository paragraph or text may guide recall responses. Topically organized passages, as opposed to topically disorganized passages, tend to positively influence the amount and order of recall (Aulls, 1975; Danner, 1976). As well, certain text signals may facilitate sensitivity to text structure which in turn may influence recall of expository prose (Meyer, Brandt and Bluth, 1980). Likewise, propositions high in the hierarchical structure may be easier to recall than those low in the hierarchical structure (Waters, 1978). Third, sensitivity to the organizational structure of prose and the ability to follow the hierarchical organization of macro and micropropositions to form the macrostructure or gist of expository text seems to influence how information is processed and recalled (Elliott, 1980; Englert and Hiebert, 1984; McGee, 1982, Meyer, Brandt and Bluth, 1980; Taylor, 1980). However, it appears that readers vary in their sensitivity to text structure. Better readers seem more likely to use the author's text structure for organizing their recall than students of lower reading ability (Bridge and Tierney, 1981; Bridge, Tierney and

Cera, 1978-79; McGee, 1982; Meyer, Brandt and Bluth, 1980; Taylor, 1980). As well, elementary students seem to demonstrate minimal natural sensitivity to the organization of expository prose (Taylor, 1980). Fourth, there is a question as to whether sensitivity and the ability to use text organization follows developmental trends in accordance with age and schooling (Danner, 1976; Englert and Hiebert, 1984; McGee, 1982; Taylor, 1980). However, because the minority of children who do demonstrate sensitivity to text structure seem better able to recall more of what they read, researchers have suggested that students may benefit from instruction in the use of text structure (Elliott, 1980; Englert and Hiebert, 1984; Taylor, 1980). Finally, researchers have indicated a need for investigations which help to discover "how best to instruct children in the use of text structure ... [and] ... what type of instruction is most facilitative of student learning at particular stages of development" (Englert and Hiebert, 1984, p. 73-74).

The Effects of Headings on Recall and Comprehension of Expository Prose:

The Importance of Teaching Students to Use Headings

Several researchers agree that students who are sensitive to the organization of ideas in expository selections seem better able to recall what is read than

students who are not sensitive to text structure (Taylor, 1982; Meyer, Brandt and Bluth, 1980). The importance of alerting students to cues in expository texts to increase awareness of the organizational structure of the material has been stressed by several study skills experts (Brown, Campione and Day, 1981; Christensen and Stordahl, 1955; Herber, 1965, 1970; Jewitt, 1965; Niles, 1965). Although many textbook features (such as titles, topic sentences, paragraph abstracts, advance organizers, boldface type, sentence outlines, pretests, hierarchical outlines, introductions, summaries, etc.) aid readers in conceptualizing the macrostructure of the material to be read, one feature usually found in texts and recommended for use when gathering information about text content is the common textbook heading.

Many educators have advocated that students be taught to use headings. For example, Robinson and Hall (1941) found that college students lacked awareness of headings and suggested that students would benefit from instruction. Christensen and Stordahl (1955) also found that mature students did not use headings as an aid for recall and indicated that training was necessary before these organizational devices could be used effectively.

Jewitt (1965) pointed out that textbooks are planned to help students learn but that students need to be aware of how to use the aids provided in a text before information can be effectively obtained. She stated that

headings and subheadings act as guideposts which provide students with an overview of the material to be learned. Jewitt further specified that students need to be taught the values and purposes of headings.

Niles (1965) concurred with Jewitt when she stated that students need to be taught how to use textbook headings effectively. Niles pointed out that headings present students with an outline which can be used to preview the content to be read.

Herber (1965,1970) included headings as one aspect of the external organization of content materials. He reasoned that external organizers can be used by students "to decipher what priorities authors place on ideas and information and to identify the nature of the content present in the text" (1970, p. 82) and that headings provide the reader with information about the text's structure or organization. Furthermore, Herber maintained that students are apt to ignore external organizational text characteristics unless they are specifically addressed. He concluded that "even at the cost of laboring the obvious" (1970, p. 84), teachers should instruct students to attend to the external characteristics of text structure.

Brown, Campione and Day (1981) also asserted that children need to be taught to examine the logical structure of expository text for devices such as headings, subsections, topic sentences and summaries which cue the reader to the important ideas to be recalled.

Summary

A number of authorities have suggested that the use of headings aid in conceptualizing the organizational structure of expository text. They have also stressed that students need to be taught this skill if it is to be used effectively.

Theoretical Perspectives Regarding the Effectiveness of Headings

While study skills experts have advocated that students need to be taught how to use headings, researchers have attempted to theoretically expound on how headings affect comprehension and recall of expository material. The effect headings have on the processing and recall of expository prose has been explained within the context of schema theory, Ausubel's (1960) subsumption theory and Kintsch and Van Dijk's (1978) text processing and production model. Each theory has, inherent in its design, the premise that in order to fully comprehend what is read, a reader must internalize a representation of the whole, main idea, gist or macrostructure.

The basic assumption of schema theory and Ausubel's (1960) subsumption theory is that people process information into hierarchically organized memory placekeepers or slots (Brooks, Dansereau, Spurlin and

Holley, 1983). These slots or schemata and subschemata are filled and modified when the schema, the person's existing knowledge of an object, concept, idea or process, is activated and added to (Brooks *et al.*, 1983; Anderson, 1977). For example, a schema for a ski resort may contain slots for snow conditions, terrain, ski lift facilities, restaurant facilities, and night life. These slots are filled when a new resort is visited, read about, or recalled.

Each subschemata has its own subschemata with placekeepers which can also be activated depending on the person's interest in the topic. For example, if a skier wished to go to the ski resort with the best snow conditions he would be interested in information about the number of centimetres of fresh snow, hard pack versus powder snow, skied out versus not, chances of precipitation, etc. In this instance snow conditions was the most important facet of concern for this skier and therefore became the factor which controlled his search for information. According to schema theory the concepts which a person finds most important about a topic "serve as a schema, controlling the gist of the topic" (Kintsch and Van Dijk, 1978, p. 373).

Schema theory implies that the person already has in his cognitive structure a coherent schemata for a topic. However, when faced with unfamiliar expository text, students often do not have a coherent schemata for the

topic to be read (Brooks *et al.*, 1983). In fact, as explained by Brooks *et al.* (1983), "part of the task of learning new material may be conceived of as the acquisition of new schemata..., which once acquired may be important in guiding subsequent processing" (p. 293). They suggest that the use of headings may aid in acquisition of new subschemata by providing a base for incoming information.

Closely aligned to schema theory is Ausubel's (1960) subsumption theory. This theory is based on the notion that a person's cognitive structure is organized in terms of superordinate inclusive concepts which subsume subordinate concepts and ideas (Ausubel, 1960, p. 267). Ausubel (1960) hypothesized that learning and retention of unfamiliar material could be facilitated by providing the reader with a conceptual framework for forthcoming information. To test this hypothesis he presented students with an advance organizer (a summary statement which highlights the main concepts of the text) prior to the reading of relatively unfamiliar expository passages. The notion that advance organizers would enhance the incorporation and retention of the material was supported by the significant results of Ausubel's earlier studies (Ausubel, 1960; Ausubel and Fitzgerald, 1961). However, subsequent research on advance organizers have produced mixed results (Proger, Taylor, Mann, Coulson and Bayuk, 1970; Proger *et al.*, 1973) but seemed to show that advance

organizers are most effective at the encoding stages of text processing (Ausubel, 1968; Mayer and Bromage, 1980). As well, advance organizers seem most likely to facilitate recall when they encompass the main topics of the text (Ausubel and Fitzgerald, 1961; Proger *et al.*, 1970; Slater, Graves and Piché, 1984). Holley, Dansereau, Evans, Collins, Brooks and Larson (1981) have suggested that effective utilization of headings may affect the encoding of information in much the same way that advance organizers enhance the incorporation and recall of new information. They explained that headings

provide information about the structure of knowledge in a particular domain and/or the author's communication structure. During input processing, headings potentially provide cues for triggering a student's prior knowledge and a system for organizing the information for higher order comprehension and storage. During output processing, headings may serve as retrieval cues and as formats for responding (Holley *et al.*, 1981, p. 227).

The potency of headings on recall has also been explained within the context of Kintsch and van Dijk's (1978) model of text comprehension. This model includes schema theory and encompasses similar perceptions as presented in subsumption theory. Kintsch and Van Dijk (1978) assumed that cognitive memory is hierarchically organized. They also postulated that prose has a hierarchical semantic structure comprised of micro and macropropositions. The probability of recalling and retaining macropropositions is increased if they are

located high in the content structure (Kintsch and van Dijk, 1978; Meyer, 1984). The probability of recalling macropropositions is also increased by cues in the text which mark those ideas considered important by the author (van Dijk, 1979). These cues include headings and subheadings (Meyer, 1984). As explained by Meyer, "titles and subtitles [headings] can be employed to focus on the macropropositions and explicitly signal the structure of the text" (Meyer, 1984, p. 133). Therefore, it seems that a reader can use the external organization of headings to gather information about the relationship between micro and macropropositions. This information can then be transformed into the gist of the text which can be utilized for subsequent reproduction of the concepts in the selection.

Summary

In light of the theoretical perspectives which have been presented, it may be assumed that headings facilitate comprehension and recall of expository text by:

1. acting as cues for prior knowledge;
2. providing a schematic base for the acquisition of new knowledge;
3. acting as cognitive organizers which highlight the main concepts of the text;
4. facilitating the mental operations of encoding macro and, micropropositions to form the macro structure of the text; and

5. acting as retrieval cues for recall of the macrostructure of the text.

Non-Instructional Exploratory Studies Which Examined the Effects of Headings on Comprehension and Recall of Expository Prose

Educators and theorists agree that since headings signal what ideas are to be developed in a text their effective use should facilitate comprehension and recall of expository discourse (Robinson and Hall, 1941; Herber, 1970; Brown, Campione and Day, 1981). Whether headings are used by students, are useful in making expository texts easier to comprehend, and do aid in macrostructure formation and retrieval of ideas are questions that several researchers have addressed. Studies which have investigated these issues can be divided into two categories: those which included training in their experimental procedures and those which did not. To provide a perspective on students' natural tendencies to use headings as an aid in comprehension and recall of expository prose, only those studies which did not include an instructional component in their experimental procedures will be presented in this portion of the literature review.

One of the earliest studies which investigated mature students' use of headings was conducted by Robinson and Hall in 1941. Two classes of college students read

"headed" and "unheaded" selections on the topics of Russian history and Canadian history. Robinson and Hall had expected the presence of headings to facilitate reading efficiency. Instead they discovered that few subjects made use of the text headings when studying the material. No significant differences were found between the means and standard deviations for both rate of reading and comprehension accuracy of "headed" versus "unheaded" selections. Robinson and Hall concluded that the students' lack of study skill strategies indicate a need for instruction.

Christensen and Stordahl (1955) also examined the effect of headings on older students' (airforce trainees) comprehension. The investigation was concerned with superimposing organizational or structural cues on printed material and the differential effects of each on immediate and delayed retention. Two passages, one on international communism and the other on principles of aerodynamics were written to include one of the following combinations: 1) an outline at the beginning of the passage, 2) a summary at the beginning of the passage, 3) a summary at the end of the passage, 4) underlining of main points, 5) headings in statement form, 6) headings in question form, and 7) a category of no organizational aids.

The results of the study found no significant differences between students' use of any of the organizational aids for either immediate or delayed

comprehension as measured by multiple choice pretest-posttest scores. Like Robinson and Hall, Christensen and Stordahl concluded that training may be necessary before individuals use study aids effectively.

Twenty-five years later Hartley *et al.* (1980, 1981, 1983) conducted a series of experiments to determine the effects of titles and headings in various forms and combinations on recall and retention of information. The first experiment (Hartley, Kenely, Owen and Trueman, 1980) involved 200 second-year British comprehensive pupils (i.e., 12 and 13 year olds). The students were clustered into high, medium and low ability groups on the basis of school records and first year examination results. Depending on the treatment to which each had been systematically assigned the students read one of four versions of a 400 word descriptive prose passage on Florence Nightingale's nursing career. The four versions included: a) a control passage containing no organizational aids, b) a passage with a title, c) a passage without a title but with headings in the form of statements, and d) a passage without a title but with headings in the form of questions. Immediately following the reading of the passage, the pupils answered a set of eight short-answer factual questions designed to measure recall of main points in the text. Two weeks later without warning and without re-reading the passage the students were retested for retention of the text information. Both parts of the

experiment were conducted by the classroom teachers who followed standardized instructions.

The combined averages of the immediate and delayed test scores from the 175 pupils who were present for both sessions were analyzed. The investigators reported that giving the passage a title had no effect on recall. However, the presence of headings had a statistically significant effect on recall for all ability groups. In addition it seemed to make no difference whether the headings were in statement or question form but low ability students recalled more from text with headings in the form of questions.

Their intrigue with the significant positive effect of headings in the form of questions on low ability students' recall prompted Hartley, Morris and Trueman (1981) to investigate the effects of passages containing headings in the form of questions compared to passages with headings in the form of statements on remedial students' recall. This study involved 16 boys and 5 girls, whose IQ ranged from 78 to 96, whose average age was 12 years, 8 months, and whose reading ages ranged from 7 years 3 months to 10 years 8 months. The students were divided into two groups (1 group of 10 students and another group of 11 students) equated for intelligence and reading age. They were assigned one of two versions of an adapted passage on the topic of food preparation and consumption in the Middle Ages. Version A contained headings in the margin written in the form of

questions while Version B contained headings in the margin written in the form of statements. The students were given 15 minutes to read the assigned passage. As in the first study the pupils wrote short answers to factual recall questions and were retested one week later.

The statistically significant results indicated that recall from the passage with headings in the form of questions was 15 percent greater than recall from the passage with headings in the form of statements. In addition this superiority was retained for at least one week. The effect of giving the passage a title was negligible. The authors concluded that teachers should not only consider writing headings when producing classroom materials but should write these headings in the form of questions to help less able children in their reading. However, this suggestion might be best generalized with caution to the universe of less able readers considering the study's small sample size (10 to 11 subjects per treatment group). As well, the design did not include a control group, making it difficult to evaluate the full effect of headings as questions or statements on recall.

Hartley and Trueman's (1983) interest regarding the effects of headings on recall, search and retrieval, led to an ambitious series of nine experiments. These experiments were designed to systematically investigate, replicate, and build on one another and on past research. Specifically, the nine experiments focused on:

1. recall (memory tasks) and retrieval (search tasks) from familiar and unfamiliar text;
2. the position of headings (headings in the margin versus embedded headings); and
3. the kind of headings used (headings in the form of a statement versus headings in the form of a question).

Experiments 1 and 2 focused on recall; Experiments 3 and 4 focused on searching unfamiliar text; Experiments 7, 8, and 9 focused on the purpose of the task (recall, search and retrieval) and the nature of the headings (questions versus statements).

The participants in all nine investigations were fourth-year British comprehensive school pupils (14 and 15 year olds) with varying reading abilities. Students from remedial classes were not involved in the studies. Each investigation was conducted in a different school and involved anywhere from 4 to 6 separate classes, or 115 to 185 students per experiment. The students were clustered into ability groups and in each experiment an equal number of boys and girls were randomly assigned to treatment conditions. The participants received one of four versions of a test passage to suit the investigation underway. The 1,000 word passage, suitable for 15 to 17 year olds as indicated by the Flesch readability score of 55, was adapted from a magazine article on the topic of television viewing habits in the United Kingdom. An examination of the procedures utilized in the recall, search and retrieval

experiments follows.

During the untimed recall experiments (experiments 1, 2 and 7) the participants were required to carefully read through a passage containing either embedded headings, headings in the margin, or no headings. The subjects then completed 12 short answer questions. The order of the questions was varied to minimize cheating. The study did not disclose the amount of time used by subjects in the various treatment groups nor was any information about procedures used for scoring included in the article.

In the search experiments (experiments 3, 4, and 8) another group of subjects participated in a whole class guided practice task prior to independently completing the main exercise. The practice task passage contained either embedded headings, headings placed in the margins, or no headings followed by five questions. Without reading the passage the students were first required to circle the bit of text that answered each of the five questions. The expected procedure, an explanation of the task requirements and the need for accuracy were stressed after each question was answered. However, it was not clearly specified who gave the directions or if the directions were standardized. Following the practice task passages each subject then received a version of the experimental passage typed in the same manner as his or her practice task. Again, without first reading the passage each student independently answered 12 questions in the same manner as previously

outlined. Again, the questions were varied to minimize cheating. The length of time students took to finish the assignment was gauged in the following way. Every 20 seconds an experimenter would write a different random number in the display box on the chalkboard. At the time of completion each student was required to write down the random number currently on display. This was then checked by an experimenter to see that this had been done correctly.

The retrieval experiments (experiments 5, 6 and 9) required another group of subjects to participate in the practice task outlined above in the search experiments. This time each student read the passage first before answering questions. Finally the subjects read the experimental passage (for up to six minutes) and completed the retrieval task as outlined above. The experimenters employed the same precautions of varying the question order per passage version and of checking the number recorded by each subject after task completion.

Contrary to the findings of Robinson and Hall (1941) and Christensen and Stordahl (1955), Hartley and Trueman's summary of the nine experiments indicated that headings aided recall, search and retrieval of information from expository text. The presence of headings produced significant results in eight of the nine experiments. As well, pupils in the headings groups performed better than 66 percent of pupils in the no-headings groups. However,

contrary to the results of the 1981 study, was the finding that the position of headings (marginal or embedded) did not significantly effect recall, search and retrieval. This lack of significance might be attributed to the fact that all subjects in six experiments participated in a group practice task prior to completing the assigned experimental task. The practice task may have cued the pupils to use headings (regardless of their position in the text) with similar competence. Also contrary to Hartley *et al.*'s earlier investigations (1980, 1981) was the finding that headings as questions versus headings as statements produced no differential effect in the recall, search and retrieval studies. As well, no significant interaction was found between ability and the type of heading used. Hartley and Trueman suggested that this finding be treated with caution since different school measures of ability were used for classifying students into ability levels.

Due to the condensed presentation of information about the experiments and lack of information regarding scoring procedures, task administration procedures, and analysis of data it is difficult to fully critique the nine experiments for methodological flaws which may have influenced the results. However, one aspect which might have influenced the results was the choice of test used to measure students' recall. The short answer quiz may have triggered recall of information which otherwise might not have been remembered. As revealed by Hartley and Trueman, "some

particular questions had reduced error rates in the headings groups... but these questions were not the same in each of the three experiments" (p. 211). The short answer test may therefore not be a stringent measure of the effects of headings on recall. Consequently the results of this study seem best generalized to older readers under the same experimental conditions.

The final study to be analyzed in this section of the literature is the most recent examination of the effectiveness of headings on recall. It is also the only group of investigations which concurrently examined a wide range of readers to discover whether the use of headings was developmental in nature. These studies conducted by Gibbs (1985), King (1985) and Stables (1985), involved a total of 300 students. In three concurrent parallel investigations (Stables studied Grades 5 and 6; King studied Grades 7 and 8 and; Gibbs studied Grades 9 and 10), the researchers examined the effect of expository passages with and without headings on the quantity and organization of written recall.

During the first session of the study the Gates McGinitie comprehension subtest was administered to all participants to determine the students' reading abilities. During the second session of the study half of the students at each grade level were randomly selected to read a headed or an unheaded version of a passage written at a grade three readability level (Parrot Passage). The other half

of the students read a headed or unheaded version of an expository type passage written at their approximate grade level. All students were given 10 minutes to read the assigned passage and 25 minutes to write an immediate test of written recall. The procedure for the third session was similar to that of the second session except that the students received whichever headed or unheaded passage they had not yet read. Recall protocols for the second and third sessions were scored for quantity, format, and organization of the superordinate and subordinate ideas recalled.

The investigators found that, across all grade levels, the presence of headings in expository text did not significantly facilitate students' recall or organization of subordinate or superordinate ideas. Students who followed the organizational structure of the passages, however, seemed to recall a greater quantity of ideas. As well, the presence of headings seemed to influence the format of the written protocols. Some students embedded identical or modified versions of passage headings in their written protocols. Other students listed headings first before writing the subordinate ideas of the passages. The findings seem to indicate that many students may have been verging on awareness of the utility of headings as recall aids. This notion is strengthened by the fact that no students included headings when writing protocols for passages that did not contain these retrieval cues. In

addition, Stables (1985) found that the presence of headings seemed to positively affect the number of subordinate ideas recalled from a passage of low readability by poor fifth grade readers (<50th percentile on Gates MacGinitie Reading Comprehension Subtest).

The investigators also found a developmental trend in the quantity and organization of ideas as indicated by the recall protocols for the passage of low readability level (Parrot Passage). Grades 5 and 6 students recalled few subordinate ideas and appeared not to use the subordinate text structure to recall ideas. Students in Grades 8, 9, and 10 recalled a greater number of subordinate ideas and therefore seemed more able to use the subordinate structure of the passage to recall details. These findings are not surprising. Considering the fact that secondary school students generally have higher reading abilities and greater exposure to expository prose, it seems logical that reading and recall of a passage of Grade 3 readability would be an easier task for older than for younger students. There did not appear to be any developmental effects in the quantity of superordinate versus subordinate ideas recalled from the grade level passages. Familiarity with passage content (Grade 7 passage) and the high readability of other passages (especially the Grade 6 passage) may have confounded the results. The investigators concluded that older students (Grades 6, 7, 8, 9, and 10) would benefit from instruction in the use of

headings. They suggested that Grades 6 and 7 students should receive instruction in study skills "as these students would be able to utilize the abstract reasoning skills necessary to internalize the study skill strategies that involve the overview of text organization and awareness of the author's schema" (p. 103-104). Finally they concluded that future studies should "utilize or expand the range of grade levels" (p. 103) ... and [include] some form of instructional component" (p. 104) to better understand the effect of headings on comprehension and recall of expository material. The conclusions made by Gibbs, Stables and King (1985) warrant special attention. The recommendations that Grade 6 and 7 students should receive instruction in the use of headings because they would be most able to use the abstract reasoning skills required to learn the study skill implies that younger students in the intermediate grades would not benefit as much from such instruction. Their suggestion may have some merit. The ability to use an author's text structure and headings to facilitate recall may be developmental. Mature readers may benefit more from instruction than younger students.

Summary

This section of the literature review discussed studies which examined the effects of headings on students' comprehension and recall of expository prose when students

had not been trained to use headings. Some findings indicated that merely providing readers with headed text enhanced recall, search and retrieval (Hartley, Kenely, Owen and Trueman, 1980; Hartley, Morris and Trueman, 1981; Hartley and Trueman, 1983). However, the significance of these findings must be viewed in light of the kinds of tasks performed during and after reading. Common to these studies which found significant results for the presence of headings was the use of a short answer test. Although such a measure may provide an indication of students' abilities to recall facts, its potential to trigger recall of information may not provide a clear indication of the depth of recall. Nor may it provide a robust examination of the effect of headings on macrostructure formation, retrieval and production.

Findings from the remainder of the studies indicate that providing students with headed text is not enough to facilitate comprehension and recall. This seems to indicate that students would benefit from instruction in the effective use of headings (Robinson and Hall, 1941; Christensen and Stordahl, 1955; Gibbs, 1985; King, 1985; Stables, 1985).

The findings of the studies in this section also suggest that the presence of headings may have differential effects on recall of low, average, and high ability students. One study reported that the presence of headings, whether in question or statement form enhanced

recall of all students but seemed particularly beneficial to students of low reading ability (Hartley, Kenely, Owen and Trueman, 1980). Other studies have indicated that older and better readers recall more superordinate and subordinate ideas and have better subordinate organization after reading a passage of low readability (but not after reading passages at grade level) than younger and less able students (Gibbs, 1985; King, 1985; Stables, 1985). Stables indicated that headings appear to significantly affect the number of subordinate ideas recalled from a passage of low readability by poor fifth grade readers. These mixed results make it difficult to conclude which students would tend to benefit most from the presence of headings.

Finally, it has been suggested that the effective use of headings with or without instruction may be developmental in nature (Gibbs, 1985; King, 1985; Stables, 1985). The studies reviewed thus far did not include training in these experimental procedures. As well, these studies were conducted with students from grades five to college level. No studies were found which examined grade four students' ability to use headings as an aid to recall of expository material.

Instructional Studies Designed to Sensitize Students to Headings, Text Structure and Macrostructure Formation

The findings of studies like those conducted by Robinson and Hall (1941) and Christensen and Stordahl (1955) made educators aware that there was a need to teach students to use headings before this external text organizer could enhance learning of expository prose. Likewise the findings of studies conducted by Meyer, Brandt and Bluth (1980), Elliott, (1980), Taylor (1980), and Englert and Hiebert (1984) prompted researchers to suggest that students would also benefit from instruction in text structure. At present instructional studies that have focused on headings (Brooks *et al.*, 1983; Dee-Lucas and Di Vesta, 1980; Doctorow, Wittrock and Marks, 1978; Holley *et al.*, 1981; Robinson, 1970) text structure and/or macrostructure formation (Alvermann, 1982; Boothby and Alvermann, 1984; Bartlett, 1978; Taylor, 1982; Taylor and Beach, 1984) are few in number. However, researchers have reported some success in training students to use such strategies through the utilization of direct instruction (Bartlett, 1978; Robinson, 1970; Taylor, 1982; Taylor and Beach, 1984); and generative processing tasks (Alvermann, 1982; Dee-Lucas and Di Vesta, 1980; Doctorow, Wittrock and Marks, 1978; Taylor, 1982; Taylor and Beach, 1984). It seems that less intense forms of instruction have not been

as successful (Holley *et al.*, 1981; Brooks *et al.*, 1983) as those previously mentioned. An explanation of the terms "direct instruction" and "generative processing tasks" is required before reviewing instructional studies which have focused on headings, text structure and macrostructure formation.

According to Brown, Campione and Day (1981) direct instruction includes those strategies which explicitly inform students about why an activity is appropriate and explicitly show students how to use, monitor check and evaluate the learning strategy. In a similar vein Baumann (1986) defines direct instruction as teacher behaviors which include telling, showing, modelling, demonstrating and direct teaching. His examination (1983) of the accumulating research on teacher effectiveness (based on a 1981 review by Berliner) and comprehension instructional strategies (based on Pearson's 1982 and Brown, Campione and Day's 1980 review of effective teaching strategies) enabled him to synthesize theoretical and applied research into six principles for the development of reading comprehension methods and materials. These principles include: 1) teach a relevant skill, 2) proceed from simple to complex, 3) provide enough instruction, 4) administer direct instruction, 5) provide teacher-directed application, and 6) require independent practice.

Instruction in generative processing tasks, as proposed by Wittrock (1974), seems to be another way of

facilitating text comprehension and recall of expository prose. Generative processing requires active reader-text interaction and is based on the premise that "reading comprehension occurs when the reader actively constructs meaning for the text" (Doctorow, Wittrock and Marks, 1978, p. 109). Wittrock maintains that learners who construct meaningful elaborations of the text while encoding provide themselves with semantic retrieval cues which enhance the recall of information relevant to these elaborations.

One of the earliest successes in which a form of direct instruction was used to teach students how to utilize headings as a tool for learning and retention of the text's macrostructure was reported by Robinson in his book *Effective Study* (4th edition, 1970). During the time of World War II it was discovered that soldiers who needed to train for specialized positions had difficulty doing so because of inefficient study strategies. As a result Robinson devised the SQ3R (Survey, Question, Read, Recite, and Review) study procedure to facilitate the processing and recall of complex material. Although variations of this technique have been developed, the basic form of SQ3R requires the reader to survey chapter titles, introductory paragraphs, summary paragraphs, headings, italicized words, pictures, and graphic aids. Surveying these external text components orients the reader to the material to be read. At the same time the reader mentally develops questions to be answered which ensures purposeful reading of the text.

Finally the reader reads to find answers to the questions, recites information and reviews the important points. Robinson reported that military personnel who received instruction in this technique studied with greater efficiency and retained more of what they read. Use of the SQ3R technique is still recommended by current reading methodologists. The success of the SQ3R technique also suggests that directing students to survey and use headings to formulate questions about forthcoming material enables them to process information with greater efficiency.

Several years later Bartlett (1978) reported success in using a direct instructional paradigm and generative processing tasks to teach high school students about text structure. This investigation developed an instructional strategy to help ninth grade students recognize main ideas as well as antecedent/result, problem/solution, compare/contrast, and general descriptive text patterns in 250 word expository passages. The students were also trained to organize and produce written recalls according to the author's top-level structure. Although the results of this study are limited to high school pupils it was found that students who had received instruction focusing on text structure produced better memories for the passages than students who had not been instructed.

In the same year Doctorow, Wittrock and Marks (1978) reported success in directly instructing intermediate students in generative processing tasks that involved the

utilization of headings. The investigators hypothesized that retrieval of relevant information would be facilitated if students were instructed to use text headings to generate memories (sentences) for paragraphs. A total of 488 sixth grade students were randomly assigned by sex and reading ability to one of 3 control or 5 treatment groups. The results of the study found that stories with paragraph headings which restated or cued the main ideas of the paragraphs, significantly facilitated recall of both high and low-ability readers. The results also indicated that the combination of instructing students to use headings and to generate sentences about story paragraphs approximately doubled the comprehension recall scores of the experimental group as compared to the control group. Although the findings of this investigation are limited to narrative paragraphs, the results support the notion that generative processing and the use of headings aid in comprehension, retrieval and recall of information.

Further research utilizing a generative processing approach and direct instruction was conducted by Dee-Lucas and Di Vesta (1980). The experiment was designed to examine the effects on recall of providing students with topic sentences, headings, related factual sentences and unrelated sentences as compared to having students generate the same four organizational contexts. The study involved 133 female university students who received additional course marks for voluntary participation in the experiment.

The participants were randomly assigned to one of the eight treatment situations. All subjects were required to read a 522 word descriptive passage on minerals. The passage contained 15 paragraphs of 3 sentences each. Three separate immediate measures of recall were used to examine the performance of subjects under each treatment. These included: a free recall task to measure recall of facts (students wrote down everything they could remember); a matching task to measure recognition of facts (students matched paragraph topics to attributes); and a test for knowledge of passage structure (students filled in a hierarchical tree diagram with superordinate facts).

The results revealed that the contexts had differential effects on recall only when they were generated. Dee-Lucas and Di Vesta reported that the generation of topic sentences significantly influenced recall of text structure. As well, the generation of headings significantly influenced retention of subordinate information (as revealed by the free recall task), topic-attribute pairings and passage topic (as revealed by the text structure task). Dee-Lucas and Di Vesta suggested that the students' generation of headings may have emphasized the topics which in turn triggered recall of topic attributes. They also suggested that the generation of topic sentences may have invoked readers to use topics and provided headings to recall concepts.

However, the findings also suggested that although the provided contexts treatments seemed not to enhance knowledge of passage structure they did seem to facilitate recognition of subordinate information (as measured by the matching task) better than the generated contexts. As interpreted by the researchers, generation tasks may enable readers to focus attention on particular portions of the text but at the expense of recalling other information that might otherwise be remembered by skilled readers whose attention was not diverted by a generative activity.

Although the findings of Dee-Lucas and Di Vesta's study are limited to female university students the results seem to indicate that the presence and generation of headings aid in recall of information. However, as concluded by Dee-Lucas and Di Vesta, organizational aids and generative processing tasks are only effective if they induce the reader to process information that otherwise may not be recalled.

One year later Holley, Dansereau, Evans, Collins, Brooks and Larson (1981) attempted to examine the effect of training students to use intact headings (topical outline format) and embedded headings (appropriately positioned in the text) under conditions of immediate and delayed recall.

In this study, 95 university students were randomly assigned to one of the following four experimental groups: a) an input training treatment group that was instructed to tie headings to the passage information while reading,

b) an output training group that was instructed to use the provided outline to study and retrieve information, c) a no-training-with-headings control group that was told to use their "normal" methods of studying, and d) a no-training-no-headings control group that was also told to use their "normal" methods of studying. All subjects participated in four sessions. In the first session, the participants received their instructions as previously outlined. They were then required to read a passage for 20 minutes and to complete a free recall test. In the second session all subjects studied one of two 2400 to 2500 word passages (one on Ecosystems, the other on Plate Tectonics) for 50 minutes and completed a free recall exam. In the third session each subject studied the second passage (that he/she had not studied in session two) for 50 minutes and completed a free recall test. During the final session which took place after a five day delay, each subject was requested to write down everything remembered from the last passage that was studied. The non-significant findings of the study seemed to indicate that training did not improve recall performance. The experimenters suggested two possible reasons for these findings: the training period may have been too short to significantly improve recall; and the training may have interfered with the subjects' existing study strategies. However, it was found that students provided with headings recalled more than students whose text did not contain headings. Approximately eleven

percent more information was recalled at immediate testing and approximately 44 percent more information was recalled at delayed testing. These findings indicated that training students to use headings may facilitate recall especially when recall is delayed. The investigators suggested that headings may have greater utility as retrieval aids than as comprehension facilitators.

Brooks, Dansereau, Spurlin and Holley (1983) conducted two studies to extend the latter experiment. The two investigators compared the effects of embedded headings and intact headings (outlines) used separately and in combination on the processing of complex expository material. The investigators hypothesized that the heading-outline combination would act in a complimentary manner to increase comprehension; outlines would provide information regarding relationships between superordinate ideas while headings would supply information about the relationship between superordinate and subordinate ideas (p. 297). In the first study 132 university students were randomly assigned to one of the following four groups: a) Outline and Headings, (O & H), b) Outlines Only, (O), c) Headings Only, (H), and d) No headings, No Outlines Control, (C). The two passages used were the same as those employed in the Holley *et al.* (1981) experiment. Three dependent measures, an essay summary, an outline of the passage and a multiple choice test were utilized to test recall of information, knowledge of text structure and

recognition of text information, respectively. Instructions were not given orally. Instead, all subjects received a study folder containing the passage (ecosystems or plate techtonics) and treatment (O & H, H, O, C) to which they had been randomly assigned, and a test folder containing materials and instructions for the essay, outline, and multiple choice test. Fifty minutes were allotted for the study of the passage. Five minutes later the subjects completed the three dependent measures. In the next session subjects studied the passage not read in the first session. After a five day delay all subjects completed the three dependent measures.

An analysis of the immediate testing revealed no significant effects for any of the four treatments. As interpreted by Brooks *et al.* (1983), these non-significant results suggested that all subjects had the same amount of information from which to draw at the time of immediate testing, indicating that the outlines and headings had little influence on immediate recall of complex text material. They further posited that immediate testing may have masked the potential effects of headings and outlines.

In addition, an analysis of the delayed testing revealed that the Headings Outline groups did not perform as well on the dependent measures as the Headings Only group. The investigators suggested that the combination treatment forced subjects to divide their attention between the headings and outlines, thereby confounding rather than

aiding delayed recall of information. However, the Headings Only group consistently outperformed all other treatments on all three dependent measures while the Outline Only group achieved less consistently high scores on the dependent measures than the Headings Only group. The results seem to support the value of training students to use embedded headings as processing aids for complex text material. In the second experiment which involved a direct form of instruction, 106 university students were randomly assigned to one of three treatments: a) Instructions-Plus-Headings, b) Headings Only and c) No Headings, No Instructions Control. The material to be learned consisted of the ecosystems passage used in the previous experiment. The practice material consisted of a 1500 word passage covering the topic of the nervous system. The Instructions-Plus-Headings group received written and oral instructions on the use of embedded headings which consisted of a checklist of cognitive activities in which to engage while studying text material. As well they were asked to a) use the headings to predict what the material was going to be about, b) understand the appropriateness of each heading according to each section, c) memorize the headings, and d) use the headings as recall aids. Opportunity was then given for practice of using these techniques on the nervous system passage. The Headings Only groups and Control groups received oral and written instructions to use their usual study techniques. Two days

later all groups were told to study the ecosystem passage as they had during the previous session. Five days later, all groups completed the three dependent measures tests (essay, outline, and multiple choice - in that order).

The findings showed that subjects in the Instructions-Plus-Headings group significantly outperformed those in the Control group on the essay measure. As well, the Instructions-Plus-Headings group had better (but not significantly different) mean scores on the essay and outline test than either the Control or Headings Only groups.

Contrary to findings of the initial experiment the Headings Only group did not significantly outperform the Control group. The investigators posited that the Headings Only group in the first experiment may have become sensitized to the importance of using headings because of exposure to immediate and delayed headed passages and questionnaires concerning their typical use of headings and outlines. In the second experiment, however, subjects were not exposed to either of these factors and therefore may not have been as inclined to pay attention to the headings.

The results of the two studies conducted by Brooks *et al.*, seem to support the use of embedded headings as processing aids. The significant results of the second experiment also seem to suggest that students need to be trained to use headings before they are effectively utilized. However, the results of the studies by Brooks *et*

al., (1983) and Holley *et al.* (1981) also indicate that instruction in the use of headings as processing aids needs to be long enough in duration and of sufficient intensity to enable students to develop proficiency in utilizing this skill. That is, training procedures of greater intensity in which students are shown how to perform particular procedures as compared to simply telling students to use a particular strategy may be needed to yield more favorable results.

One generative activity which has been suggested as a tool for teaching students to attend to text structure is the use of graphic organizers (Alvermann, 1981; Alvermann, 1982; McGee and Richgels, 1985). Alvermann (1982) demonstrated that students who reorganize text by using graphic organizers, recall significantly more main ideas than students who simply read the text. The experiment involved thirty average and above average tenth grade students who were randomly assigned to one of two treatment groups. In one group, 15 students were trained by an assistant in a step-by-step procedure outlined by the investigator regarding how to read expository material of the listing variety and how to use key words from the text to generate a graphic representation of ideas organized in either a comparison/contrast or cause/effect relationship. Students in the second treatment group received no instruction on how to produce a graphic organizer of the text. Instead they read the same practice and experimental

passages as the other treatment group, but processed the material as they usually did in their regular social studies class. Prior to the reading of the test passage, students were informed that they would be required to produce a written recall of its contents after a one-week delay. Analyses of the results showed significant main effects for the instructional treatment. However it seemed that the generation of a comparison/contrast graphic organizer to reorganize text of the simple listing variety enhanced recall of main ideas more than recall of details. Alvermann recognized the limitations of the study such as the use of a small number of students, short time duration and the fact that graphic organizers may be text specific and most useful only when the text is written in a simple listing format. As well, the findings of this study were limited to secondary school students.

Although recent research utilizing graphic organizers as a signalling and training aid for the information embedded in the structure of text has focused on high school and college students, one very recent study did investigate the effectiveness of graphic organizer instruction on fourth grade students' comprehension and retention of social studies text material. Boothby and Alvermann's (1984) three month training study involved one experimental class originally comprised of 18 members (reduced to 11 members due to absenteeism) and one control class originally comprised of 20 students (reduced to 15

subjects due to absenteeism). Both groups read the same material, received the same number of instructional hours (40 minutes of social studies instruction three times a week), and completed the same multiple choice and free recall tests. Students in the experimental group, were trained by the investigator to use organizers as an aid for recall. Students in the control group received a directed reading instructional approach from their classroom teacher but were not exposed to graphic organizers. One week after the training period both groups were tested for recall of an experimental passage on tobacco trade. The experimental group was presented with a graphic organizer and the test passage while the control group was merely introduced to the experimental passage. Both groups were informed that a free written recall task would be required after reading.

The results of this study found that students in the graphic organizer group recalled significantly more total number of ideas than the conventional group at each of the immediate and 48 hour delayed test times. Descriptive data based on the multiple choice and free recall tasks completed during the training period also indicated that the graphic organizer group benefited from instruction. However, no significant differences in recall were found between the two groups after a one month delay. More importantly, the graphic organizer training strategy did not seem to facilitate recall of the main ideas in the passage; although students in the graphic organizer group

recalled more main ideas than the control group, this difference was not statistically significant. The investigators pointed out that the nonsignificant findings may have been attributed to two factors: the loss of subjects whose scores may have yielded significant results and the possibility that students in the control group were able to identify the text's main ideas without the aid of a graphic organizer. These inconclusive findings prompted Boothby and Alvermann to suggest the need for further research focused on training intermediate students to use graphic organizers as signalling devices to text structure.

Another signalling device which utilizes generative processing and has reportedly enabled secondary and elementary students to process expository information is that of Gloss notation (Richgels and Hansen, 1984). According to Richgels and Hansen (1984) "gloss notations can be used to focus on both the process (skills and strategies) of reading and the content (facts, concepts) of texts" (p. 312). Although this system of making marginal notes has been in existence since medieval times Richgels and Hansen suggest that educators use Otto, White, Richgel, Hansen, and Morrison's (1981) modified gloss technique to enhance students' learning and retention of expository material. Rather than having students write in their text, marginal notations are written on sheets of paper, and are keyed to text pages by numbered brackets to highlight aspects of the text to be learned. As cited by Richgels

and Hansen (1984), although early empirical research was inconclusive, positive student and teacher reactions were reported when gloss was used as a method to help students read and study driver education manuals (Dana, 1982), study for exams (Conners, 1982) and to comprehend content area texts (Telfer, 1982; Tonjes, 1981). McGee and Richgels (1985) pointed out that gloss notations can be used as an intermediary step for helping intermediate students attend to text structure before independent use of text structure is required. Stables, Gibbs and King (personal communication, IRA Conference, University of British Columbia, May, 1986) have also suggested that the gloss technique may be used to help students attend to and use headings and to signal important information in the text. However these opinions have yet to be conclusively supported by empirical research.

A recent empirical study which did not use graphic organizers nor gloss notations to help students attend to text structure but did utilize direct instruction and generative processing tasks was conducted by Taylor and Beach (1984). The first purpose of the study was to investigate the effect of text structure instruction on 114 seventh grade students' comprehension and production of expository text. The second purpose was to determine what qualitative effects text structure instruction would have on students' expository writing. One hour a week for seven weeks, three classes of students were involved in the

study, each receiving a separate treatment from the other. The experimental group received instruction and practice in producing and studying hierarchical summaries of social studies material. Producing written summaries involved generating a skeletal outline, generating main idea statements and details for each section of the outline and generating a key idea for the entire passage. Initially, students received teacher assistance but by the end of the fifth week, they generated summaries independently. Each week, time was spend in class discussion, studying, and orally recalling text formation with a partner. During the seventh week, rather than oral recalls, students practiced producing written protocols.

The conventional instruction group received instruction in the form of a directed reading lesson, which included answering and discussing questions for the same social studies material read by the experimental group. By week three, students were completing questions on their own. Each week students discussed answers to all questions, and used these answers to study and orally recall text information with a partner. During the seventh week, rather than completing oral recalls, students were instructed to write down all that they could remember.

The control group received no special reading instruction other than that which the regular curriculum offered. All classes completed pretests and post-tests involving the writing of an opinion/example essay.

Administration of the tests and lesson instruction was provided by the teacher according to detailed instruction and lesson plans developed by the investigators. During the eight weeks all students read one of two randomly assigned passages. One day later all students completed a test of written recall and a short answer quiz. One week later students completed the opinion/example post-test.

Analyses of the data indicated that the instruction and practice in summarizing according to text structure effectively enhanced recall of unfamiliar material but not familiar social studies text. Taylor also indicated that instruction seemed to have a positive effect on the quality of the students' expository composition. She also pointed out that other factors during the training period such as peer interaction, oral processing (discussion) of concepts before writing, and generative processing may have contributed to improved learning. Overall the findings support the idea that awareness of text structure is an important element in comprehending and writing expository material and that direct instruction and generative processing tasks seem to be a promising way to teach students about expository text structure.

The studies reviewed up to this point have either examined the effects on recall of instructing students to use internal text structure or of training students to use headings. However, only one researcher seems to have combined direct instruction with generative processing

tasks in a training strategy aimed at sensitizing intermediate students to text structure and macrostructure formation while utilizing headings as cues to text structure. In 1982, Taylor conducted two parallel investigations involving fifth-grade students. For both studies she utilized a similiar sample and the same instructional technique but did not attain the same degree of success.

In Taylor's (1982) first experiment 48 fifth graders were classified as competent (reading above grade level) or less than competent readers (reading below grade level). The students were then randomly assigned by reading ability to either the experimental or conventional instruction condition. All students in each treatment group received 1 hour of instruction, once a week, for 7 weeks on the same fifth grade health text book material. Two classroom teachers alternated each week between teaching the experimental or conventional instruction group.

The instruction for the experimental group focused on learning how to prepare a hierarchical summary for a three to four page segment of the health text book. To do this the students followed the external organizational structure (headings, subheadings, paragraphs) of the material and generated main idea statements for each paragraph, subsection and section of the text. Initially the group discussed the structure of the hierarchical summary that was to be prepared. They talked about the importance of

following the structure of the text, silently read the passage, independently completed and studied their summaries and finally discussed the summaries with their teacher. By the sixth week, students did not engage in pre-reading discussions. Hierarchical summaries written by the students from weeks 5 to 7 were collected by the investigator. The day after instruction in week 7, the students practiced writing a recall protocol.

The teachers of the conventional instruction group initially engaged the students in pre-reading discussions. The discussions were devised to assist students in drawing connections between their personal experiences and concepts presented in the material and as a way to motivate reading of the text. The students then silently read the health book passages, independently completed and studied short answer questions on the material and discussed their answers with the teacher. As with the experimental group, by the sixth week, the conventional instruction students no longer engaged in pre-reading discussions. Answers to questions from weeks 5 to 7 were collected by the investigator. During week 7, the students practiced writing a recall protocol.

During the eighth week, each treatment group read and studied a test passage on health and pollution. Students in the experimental group prepared and studied hierarchical summaries for the test material. The conventional group completed and studied answers to questions on the test

passage. The following day, all students were required to write down everything that could be remembered from the passage read the previous day. They also wrote responses to 20 short answer questions on the same material. Two weeks later, both groups read and studied a passage on ancient Indian tribes and followed the same test procedures as for Test 1.

Statistical analyses for Test 1 and Test 2 revealed that students who were trained to verbalize and formulate hierarchical summaries of the text macrostructure had significantly higher recall and organization scores than students in the conventional group. Competent readers in both treatment groups recalled more and had better organizational scores than less competent readers. However, students instructed in hierarchical summarization tasks did not produce higher short-answer scores than students in the conventional group.

The limitation of this first experiment, as acknowledged by Taylor (1982), was the use of intact classes. She indicated that, although randomly formed, the groups may have differed in attitude or effort which may have contributed to the differences in recall between the experimental and conventional treatment groups. For this reason, a second experiment was conducted concurrently with Experiment 1. The purpose of Experiment 2 was to replicate the results in the first study by using the same school and same practice passages but different students, teachers and test passages.

In the second experiment 48 fifth graders were pooled, grouped, randomly assigned, instructed, and tested according to the same procedures used in the first experiment. The results of this study, however, failed to support the results of Experiment 1. The recall and organization scores between the experimental and conventional groups were not significantly different. As well, the experimental group produced significantly lower short-answer scores than subjects in the conventional instruction group.

Taylor conducted several supplemental analyses to ascertain the reasons for the discrepant results between Experiment 1 and Experiment 2. The supplemental analyses revealed qualitative differences in the summarization tasks between students in the first experiment and students in the second experiment. It was found that pupils in Experiment 1 generated hierarchical summaries which were 60% accurate, on the average. Subjects in Experiment 2 generated hierarchical summaries which were only 43% accurate, on the average. As suggested by Taylor (1982) factors contributing to these differences may have included student inattentiveness or inadequate or insufficient instruction. The differences seemed to suggest that seven practice sessions, once a week for 7 weeks may not have provided students in the second experiment with enough time to sufficiently learn the hierarchical summarization technique.

Although the findings of Taylor's investigations are promising, they are nonetheless inconclusive. Taylor (1982) concluded that:

The hierarchical summarization task, or a similar technique that directs students' attention to text structure and aids them in verbalizing a macrostructure for text, warrants further investigation as a promising study strategy that elementary school students can use to help them comprehend and remember what they have read in their content textbooks. (p. 339)

Summary and Conclusions

Several educators have emphasized the need for teachers to instruct students how to efficiently process expository type material in order to facilitate comprehension and recall and ultimately, independent learning (Herber, 1970; Durkin, 1978-79; Taylor, 1980; Baumann, 1981; Ekwall and Shanker, 1985). Efficient processing of prose may require that learners be made aware of how expository text is structured (Catterson, 1985; Englert and Hiebert, 1984; Taylor, 1982) and of the differences between narrative and expository prose (Catterson, 1985; Pieronek, 1985). Efficient processing of prose may also require that learners be taught to use structural organizers such as headings to facilitate comprehension and recall of expository prose (Robinson and Hall, 1941; Christensen and Stordahl, 1955; Holley *et al.*, 1981; Gibbs, 1985; King, 1985; Stables, 1985).

Although some work has been done in this area it is evident that few researchers have investigated the effects on recall of instructing students in text structure, the use of headings and macrostructure formation. However, this research seems to indicate that generative tasks and direct instruction help readers to focus on the important information in a text which seems to improve comprehension and recall.

The limitations of design, inconsistencies in training methods, and confounding variables which have contributed to inconclusive results in some instructional studies bear mentioning. In one study the exclusive use of an immediate testing paradigm, (which seems to enable all treatment groups to have the same amount of information from which to immediately draw) tended to mask potential effects of training which may only have been obvious in a delayed testing situation (Brooks *et al.*, 1983). As well, training periods varied in length and some training periods may not have been long enough or of sufficient intensity to allow students to effectively integrate new methods into existing practices (Holley *et al.*, 1981; Taylor, 1982). Studies were also confounded by certain experimental procedures through which control groups became accidentally sensitized to structural organization and thus little significant differentiation could be found in performance between treatment and control groups (Dee-Lucas and Di Vesta, 1980; Brooks *et al.*, 1983). Furthermore one study used only cued

tests such as multiple choice tests as the dependent measure, thereby not giving an accurate perception of the effect of training on the students' abilities to comprehend and recall the selection (Brooks *et al.*, 1983).

Perhaps most noticeable is the fact that the majority of training studies have concentrated primarily on high school and college populations (Alvermann, 1981; Alvermann, 1982; Bartlett, 1978; Brooks *et al.*, 1983; Dee-Lucas and Di Vesta, 1980; Holley *et al.*, 1981; Robinson, 1970). Whether or not intermediate students are amenable to instruction in the use of headings, text structure and macrostructure formation is only beginning to be considered (Boothby and Alvermann, 1984; Doctorow, Wittrock and Marks, 1978; Taylor and Beach 1984). The few training studies which have been conducted with intermediate students have produced mixed results. While some have reported that training in the use of headings, text structure and macrostructure formation significantly affected students' comprehension and recall of expository prose (Doctorow, Wittrock and Marks, 1978; Taylor, 1982, initial study; Taylor, 1984) others did not (Boothby and Alvermann, 1984; Taylor 1982 replication study). Although Taylor's inconclusive study approximates the focus of the present investigation no one seems to have conducted such an investigation with grade four students. The question that still remains is whether grade four students can be effectively taught to be sensitive to text structure and to

use headings to facilitate and increase the quantity and organization of recall as measured by a delayed test of written recall.

Considering the importance of recalling information from expository material and the difficulty children experience when required to comprehend and recall expository prose, continued exploration of instructional strategies which enable student learning at the grade four level is warranted.

CHAPTER THREE

METHODOLOGY

This study was designed to examine the effects of training fourth grade students to be sensitive to the hierarchical arrangement of ideas in information/classification prose and to use headings to facilitate and increase the quantity and organization of written recall. This chapter will describe the research design, the selection of subjects, the selection, construction, administration, and scoring procedures of the tests utilized in the study, the instructional materials designed for the investigation, and the procedures of the pilot and main studies.

Design

In order to examine the effects of sensitizing students to text structure and of training students to use headings when studying and recalling expository passages, a quasi-experimental Pretest-Posttest Non-Equivalent Control Group Design was used (Borg and Gall, 1983, pp. 682-684;

Campbell and Stanley, 1965, pp. 46-50). This design involved administration of an initial and final test of delayed written recall to the experimental and conventional treatment groups. However, only data from the Final Recall test were statistically analyzed according to the hypotheses delineated in Chapter One. The design was chosen because it was not possible to randomly assign students to the experimental group (direct instruction to develop awareness, use and recall of headings and text structure) or to the conventional group (exposure to the same expository passages as used with the experimental group but involving the more conventional approach of reading to answer questions and correct answers).

The dependent variables measured were the quantity and organization of recall by three ability levels (below, at, and above grade level) as tested by a task of delayed written recall. To control for the main threat to internal validity (Borg and Gall, 1983, p. 683) — that group differences in quantity and organization on the Final Test of delayed written recall may have been attributable to pre-experimental group differences rather than to a treatment effect, Analysis of Covariance was used to equate the two groups of reading comprehension. A more detailed description of the statistical procedures used in the investigation have been included in Chapter 4.

Selection of Subjects

The sample for the study involved 141 fourth-grade students from six intact, non-streamed grade four classes. The six classes were selected on the basis of availability from the Catholic Public Schools of the Vancouver Archdiocese. The schools were located in the Greater Vancouver Area (East Vancouver, Vancouver, Burnaby, Coquitlam). It was not possible to randomly select the schools because acquisition of subjects for the study was dependent on acquiring permission from school personnel.

The use of intact classes also did not allow for random assignment of individuals to treatment groups. However, individual classes were randomly assigned to the treatment groups in the following manner: after initially pairing the six classes on the basis of overall average reading ability and socio-economic status (as estimated by the school principals) each class was randomly assigned to either the experimental or conventional treatment group. Thus both treatment groups consisted of three classes, one class each of low, mid and mid/upper socio-economic status.

Classification of Students into Reading Ability Levels

The comprehension subtest of the Gates-MacGinite Reading Test, Canadian Edition, Level D, Form 2 (MacGinite, 1980), was administered to both groups by the classroom

teachers to classify students as reading below, at, or above grade level and to determine if the experimental and conventional groups initially differed in reading comprehension ability. Subjects were to be classified as reading below, at and above grade level if they attained grade equivalent scores between 3.0 and 3.9, 4.0 and 4.9, and 5.0 or higher, respectively. This classification of subjects was also compared to the classroom teachers' estimates of the students' reading abilities (high, average, below average).

Testing Instruments

Standardized Test Material

The Gates MacGinitie Reading Comprehension Test.

The comprehension subtest of the Gates-MacGinitie Reading Test, Canadian Edition (1979), Form D, Level 2, was selected for use in this study for the following reasons:

Content.

Test items were developed and selected so that the test passages had "international character". The passages

were written by a number of international authors including Canadians. The content items are considered to be within the experience of students with diverse cultural backgrounds and environmental settings.

Sixty percent of the test subject matter is comprised of content area material (Social Sciences, 27.5; Natural Sciences, 27.5; The Arts, 5%). Narrative-Descriptive material comprises the remaining 40%. The test questions are of two basic types: literal and inferential. Fifty-five percent of the questions are literal and 45% are inferential. It was reasoned that the relatively high percentage of content area items was appropriate for the purpose of the study.

Standardization.

Canadian norms were based on a total sample of 46,000 students. Between 3,000 and 4,500 students at each grade level were selected from the ten provinces and the Yukon. The norming group was proportionately representative of English-speaking students in urban and non-urban public and separate schools. It was reasoned that the inclusion of separate schools in the norming population made the test appropriate for the sample used in this study.

Validity.

Test validity for most school programs was assured by Canadian educators who examined, discarded or modified test

items. This test was also considered to be a good measure of comprehension ability because the standard time allotment for the subtest allows all but the very slowest students to attempt each item.

Reliability.

Kuder-Richardson Formula 20 reliability coefficients for the Canadian Edition, Level D, comprehension items range from .87 to .89. These were considered to be acceptable levels of reliability.

Non-Standardized Test Material

Two passages of parallel construction were used in the study to examine the initial and final recall abilities of the two groups (see Appendix A). The two passages had an average Fry Readability of 3.1.

Initial Test Passage.

Use.

The Initial Test passage, entitled *Termites*, was designed to determine if the experimental and conventional groups initially differed in their ability to produce a written recall of an information/classification passage.

Construction.

This passage was designed to parallel the construction of the final test passage on: format, number of headings, number of paragraphs, number of macropropositions and micropropositions, similarity of subtopics, concept load and readability level. Both passages were written in the information/classification style, are one page in length, consist of five paragraphs with headings and have five macropropositions and 26 micropropositions.

Final Test Passage.*Use.*

The Final Test passage entitled *Parrots*, was used to examine the effects of sensitizing students to text structure and of training students to use headings on the quantity and organization of written recall.

Construction.

The final selection was based on the original *Parrots* recall passage (authored by Crowhurst, 1984) used by Stables (1985). The Stables study (1985) raised the

question of whether awareness and use of headings as an aid to increase the quantity and organization of recall was developmental or required training. It was reasoned that this question would be best addressed in an instructional study that tested for recall by using the same basic material as in the Stables (1985) study.

The text of the passage was not modified, but the headings were rewritten to more closely resemble those found in natural expository texts. Figures 1 and 2 (see Appendix A) show the 1985 Stables version of the passage and the adapted version of the *Parrots* passage used in this study.

Test Administration Conditions and Procedures

All tests were administered to the experimental and conventional treatment groups on the same day and at the same time by the classroom teachers. The teachers were requested to test children early in the morning when the students were most likely to be attentive and alert.

The standardized procedures outlined in the *Gates-MacGinitie Teacher's Manual* were used to administer the Reading Comprehension subtest.

The Initial and Final Recall Tests were also administered according to standardized instructions written

by the investigator to ensure standard conditions (directions, materials, timing) of test administration and to control for possible tester effects. The standardized directions for the 15 minute study period and for the one day delayed written recall of the passages are shown in Appendix A. The twenty-five minute delayed free-recall task required students to write down everything that could be remembered about the passage after a one day delay. This dependent measure was selected over cued response systems and immediate test paradigms because it was believed to be one test which would yield a clear perspective of the children's recall performance (Brooks et. al. 1983; Holley et al. 1981).

Scoring Procedures for Initial and Final Recall Tests

Development of Scoring Procedures

The Goble/Coulombe scoring procedures used in the study evolved from an examination of scoring techniques utilized in previous investigations by Taylor (1982), Clark (1982) and Stables (1985). The aim was to create a scoring system which represented both the hierarchical organization of macro and micropropositions in the passage and the degree to which the students recalled and organized

information from the selection. A summary of the scoring techniques used to create the Goble/Coulombe scoring procedures are outlined in Table 1.

Description of Scoring Procedures

All written recalls were collected and marked by the investigator. The subjects' recall protocols were scored against the appropriate template (which had been segmented into the macro and micropropositions of passage) for the number of propositions recalled (quantity) and for the organization of the recalled macro and micropropositions (organization). The amount of recall was calculated by assigning a mark of (1) for a complete proposition and partial marks for partial propositions. Organization recall scores were computed by using a weighted scale. Each complete macroproposition received a score of 5 regardless of whether it appeared as a topic sentence or heading. Where the same macroproposition was represented both by a heading and initial or final sentence (i.e. if the student gave a heading and a topic sentence for the same macroproposition the score of 7 was assigned. Each complete microproposition received a score of 1 if associated with the appropriate macroproposition and otherwise received no score. Partial macro and micropropositions received partial marks. A complete description of the scoring procedures for quantity and organization, scoring templates, a partial marks guideline

Table 1: Summary of Scoring Techniques Used in Developing Goble/Coulombe Scoring Procedures

Taylor (1982)	Clark (1982)	Stables (1985)	Goble/Coulombe (1986)
Recall of Expository	Recall of Narrative	Recall of Expository	Recall of Expository
QUANTITY	QUANTITY	QUANTITY	QUANTITY
scored against template of propositions	scored against template of pausal units	scored against template of pausal units representing macropropositions (superordinate ideas) and micropropositions (subordinate ideas)	scored against template of pausal units representing macropropositions and micropropositions
one score per proposition	partial or single score per unit	separate scores for macro and micropropositions per unit	partial or single score per unit
expressed as total	expressed as percent	expressed as subtotals	expressed as total out of 31
ORGANIZATION	SEQUENCE EVALUATION	ORGANIZATION	ORGANIZATION
rating of 1-5 based on number of subsections recalled in order (1 = one subsection with information recalled in order;	subjectively estimated based on observed match between author and student or computed using Kendall's tau	relation between author's sequence and student's sequence; one point for each subsection in order	weighted scores for headings and/or propositions in clusters from subsections

Table 1 continued

Taylor (1982)	Clark (1982)	Stables (1985)	Goble/Coulombe (1986)
5 = five sub- sections with information recalled in order)			
expressed as rating (1-5)	expressed as rating (excellent, good, fair or poor) or correlation (tau)	expressed as total out of 5	expressed as total out of 61
	IMPORTANCE LEVEL	FORMAT	
	weighted score for importance of each unit (1, 2, or 3)	identification of six format features: title, section headings, grouping, point form, numbering, paragraphs.	
	expressed as mean	expressed as total number of students using each feature	

sheet, and three sample student protocols together with marked templates are provided in Appendix B.

Reliability of Scoring Procedures

Each protocol booklet identified the subjects' school, name and number on the front cover. This was necessary to

aid the classroom teachers in distribution and collection of the protocol booklets for three recall situations (Initial, practice and Final Recall Tests). Thus, although every effort was made to score each protocol without bias, complete 'blind' scoring by the investigator was not possible. Therefore it was necessary to examine the reliability of the scoring procedures and to ascertain if all students had been scored with the same consistency.

To determine the interrater and intrarater reliability of scoring for quantity and organization of recall, 25% (34) of the protocols were randomly selected using a random numbers table and were blind scored by the investigator and the co-developer of the Goble/Coulombe scoring procedures. All reliability measures were calculated using the Covariance Matrix for Reliability on the SPSS-X Release 2.1 program at the University of British Columbia. The interrater reliability coefficients for both quantity and organization were .99. The intrarater reliability coefficients for both quantity and organization were also .99.

To determine whether the high degree of correlation between the two scorers was due to the fact that they had developed the scoring procedures, an independent scorer was trained and an additional 10% of the protocols were randomly selected for marking. Again the covariance Matrix yielded reliability coefficients of .99 for both quantity and organization. The high degree of correlation between

all three scorers suggests that the marking procedures allowed for consistent, objective, and reliable scoring of the students' written recall protocols.

Materials

Instructional Passages

The seven instructional passages used for both treatment groups were written in a descriptive (information/classification) style. The information/classification (descriptive) pattern was selected for passage construction because:

1. it is the pattern which is most frequently found in content area texts (Alvermann, 1981; Niles, 1965), and
2. it was the pattern of prose utilized in the Stables (1985) posttest *Parrots* passage to determine if students at the fifth and sixth grade level used headings as an aid to recall.

The passages had an average readability level of 3.4. They were written below the grade four level to minimize possible decoding difficulties.

The set of materials was designed to increase in length, concept load, number of headings and number of paragraphs. The title, readability, and characteristics of

the passages are listed in Table 2 according to the order in which each was used. All sources used in constructing these materials have been provided in Appendix E.

Table 2: Title, Fry Readability and Characteristics of Instructional Passages

Lesson Order	Title	Number of Headings	Number of Paragraphs	Fry Readability
1	<i>Grasshoppers</i>	3	3	3.8
2	<i>Riches From the Sea</i>	3	3	3.9
3	<i>Firewalkers</i>	4	4	3.7
4	<i>Vikings</i>	4	4	3.9
5	<i>Animal Protection</i>	5	5	3.5
6	<i>Horses</i>	5	5	2.2
7	<i>Animals' Eyes</i>	5	5	3.1

Materials for the Conventional Group

A set of questions was designed to focus on the macropropositions of each passage and to ensure that the material was read. A size-reduced reproduction of the set of questions used for the conventional instruction group has been included in Appendix C.

Materials for the Experimental Group

In addition to the instructional passages previously described a variety of manipulative and paper-pencil materials were constructed to incorporate generative processing tasks. These materials were designed to facilitate direct instruction in sensitization to text structure and to headings as cues to text structure. A set of all materials used for the experimental instruction group has been reproduced in Appendix D.

Procedures

Pilot Study

A two part pilot study was conducted to:

1. qualitatively evaluate and subsequently refine the Initial and Final Recall Test passages, test administration procedures and scoring procedures; and
2. determine whether students reading above, at and below the grade four level would be able to complete the Initial and Final Recall Tests.

In the first part of the pilot study one intact, nonstreamed fourth grade class in an East Vancouver

Catholic public school was used. The school's recent standardized testing (Canadian Test of Basic Skills) indicated that the students ranged from low to above average in reading ability. The investigation was conducted over a four day period. On Day One the *Termites* Initial Test passage was studied by the students for 20 minutes. On Day Two the students were given 25 minutes to produce a written recall of the Initial Test passage. The same procedures were used for the Third and Fourth days for the *Parrot* posttest passage. All protocols were collected and scored by the investigator but the resulting data was not statistically analyzed. The subsequent revisions included adjusting the original study time allotment from 20 to 15 minutes and further refinement of scoring procedures. As well readability estimates were re-checked when it appeared that the *Termites* passage was not as difficult as the *Parrots* passage. As a result *Termites* was modified slightly to give a higher readability estimate.

In the second part of the pilot study six fourth grade students from an East Vancouver public school were required to orally read each passage and orally answer literal comprehension questions for each of the selections. Of the six students, two were selected and identified by the classroom teacher as reading below grade level, two as reading at grade level, and two as reading above grade level. This informal testing indicated that students at each of the three reading levels were capable of decoding

and comprehending the passages. An informal analysis of the oral reading errors indicated decoding difficulties with the words *existed* and *unusual*. These words were subsequently removed from the *Termites* passage. Four commonly used readability formulae were then applied to both passages. The approximate readability levels of the initial and final test selections are listed in Table 3. According to the Dale-Chall Readability Formula (1948) each passage has an equal number of words that do not appear on the Dale List of 3,000 words. These words have been listed in Table 4.

Table 3: Readability Estimates of the Initial and Final Test Passage

Readability Formula	Initial Test (<i>Termites</i>)	Final Test (<i>Parrots</i>)
Fry (1968)	3.0	3.3
Smog (1974)	6.0	6.0
Spache (1974)	2.3	2.3
Dale-Chall (1948)	5.5	5.4

Table 4: Difficult Words in the Initial and Final Passages
Based on Dale List of 3,000 Words

Initial Test (<i>Termites</i>)	Final Test (<i>Parrots</i>)
appearance	admired
damage	beak
environment	beautiful
extremely	easily
insects	greatest
soldiers	interesting
termites	liquid
tropics	parrots
underground	vitamins

Main Study

Teacher Orientation.

Prior to the study the investigator met individually with each of the six classroom teachers to outline and discuss the investigation procedures.

The experimental group teachers were provided with test materials and directions, blank student protocol booklets, and a calendar outlining the proposed schedule of the study. The calendar indicated when the study began and ended, highlighted the days and times of test administration, and indicated the days and times that the investigator would be instructing.

The conventional treatment teachers were provided with a coil bound booklet which contained a calendar outlining the specific schedule of procedures, test administration procedures, instructional procedures and chronologically dated copies of all instructional materials. The teachers were also provided with blank student protocol booklets, test materials, and packaged dated class sets of all materials to be used during the study. Each teacher was shown how to use the instructional materials and received explicit instructions in test administration procedures. The investigator maintained frequent contact with all classroom teachers to ensure smooth operation of the study and to maximize instructional consistency.

Student Orientation.

One week prior to the study the investigator worked for half a day in each of the experimental classes as a "teacher's aide." The purpose of the pre-experimental visit was to become familiarized with the children in each classroom, to learn about school routines, and to prepare the children for the arrival of the investigator. The investigator was introduced as a "student from U.B.C." who was going to practice teaching the class for approximately two weeks.

Instructional Procedures.

Conventional Treatment.

The conventional instructional procedures centered on answering questions and marking the answers to these questions after reading the instructional passages. The students were instructed by the conventional group classroom teachers. An outline of the conventional instructional procedures has been provided in Table C.1 of Appendix C.

Experimental Treatment.

The experimental group students were instructed by the investigator. Instruction for the experimental group centered on providing direct instruction combined with generative processing tasks to train students to:

1. identify and survey headings;
2. use paragraph headings to identify the macrostructure of the passage;
3. be sensitive to the hierarchical organization of the macro and micropropositions in information/classification expository selections; and
4. use rememberances of headings to increase the quantity and organization of recall.

An outline of the experimental instructional procedures has been provided in Table D.1 of Appendix D.

Lesson Duration.

Most experimental group lessons were one hour in duration with the exception of Lessons 1 and 9, which were each one-half hour in length. The conventional group lessons also had a time allotment of one hour with shorter time allotments for Lessons 1 and 9.

Summary

This chapter presented the methodology of the study. It provided an overview of the research design; included a description of the subjects; described the standardized and non-standardized testing instruments and administration procedures; outlined the scoring procedures of the Initial and Final Test protocols; described the instructional materials developed for the conventional and experimental groups; reported the procedures and findings of the pilot study; and outlined the procedures of the main study.

CHAPTER FOUR

RESULTS

This chapter reports the results of the analyses of data. The statistical analyses for this study were conducted using the Analysis of Covariance (ANCOVA) and Analysis of Variance (ANOVA) procedures from the SPSS-X Release 2.1 program. The presentation of these results has been organized into three sections. The first section reports findings of the preliminary testing for possible initial differences between the experimental and conventional groups in reading ability and ability to recall an expository passage.

The second section examines the final testing results according to the quantity and organization hypotheses delineated in Chapter 1. Also included are the post hoc Scheffé analyses which were conducted to determine differences in ability groups.

The third section presents an analysis of the differences between the experimental and conventional groups on the initial and final tests regarding the students' inclusion of headings in their written recall protocols.

The ANCOVA was selected as the main statistical procedure for the initial and final recall test because it

can be used to statistically control for the influence of one or more independent variables (i.e. covariates) on the dependent variables (Borg and Gall, 1984, p. 379). The covariate in both analyses for both the initial and final tests was the subject's Reading Comprehension scores on the Gates-MacGinitie Reading Comprehension Subtest. These scores were used as a covariate because the subjects' quantity and organization scores could be conceivably influenced by their reading comprehension ability. Using the subjects' reading comprehension scores as a covariate allowed for the control of this possible source of variance.

Since the main statistical procedure used to test the Null Hypotheses was the ANCOVA it was necessary to satisfy the major assumptions underlying this technique: homogeneity of variance (that the variances of scores obtained by the experimental and control groups do not significantly differ from each other), homogeneity of regression (the regression lines for each group are assumed to be parallel), and normality (the scores are normally distributed). The normality assumption was not tested here because ANCOVA were known to be robust with regard to violations of these assumptions (Glass and Hopkins, 1984, p. 351).

For all the computations in this investigation the unit of analysis was the individual student. The probability level of .05 was the level at which the Null

Hypotheses in this study were rejected. This level of significance was selected because it is the level which is commonly used in educational research (Borg and Gall, 1983).

Analysis of the Initial Testing

The Gates-McGinitie Test

T-Scores.

Data collected from administration of the Gates-MacGinitie Reading Comprehension Subtest, Canadian Edition, Level D, Form 2 (MacGinitie, 1980) prior to the study indicated a high degree of similarity between the conventional and experimental groups. An analysis of variance (ANOVA) on the students' reading comprehension T-scores found no significant difference between treatment groups [$F(1,39)=.80$, $p>.05$]. The T-score for the experimental group ($n=79$) was 52.10 with a standard deviation of 8.13. The T-score for the conventional group ($n=62$) was 53.40 with a standard deviation of 9.13.

The groups were found to be slightly above the 1980 national norms of the Gates MacGinitie population. When compared to the 1982-83 West Vancouver school district scores, the treatment groups were found to be similar in ability and variance. Therefore although not randomly

selected the sample seemed similar in ability to other school populations in the Vancouver area. The T-scores and standard deviations of the conventional and experimental groups, national Gates-MacGinitie norms and West Vancouver school district scores are listed on Table 5.

Table 5: Means and Standard Deviations for Gates MacGinitie T-Scores by Group for the Coulombe Study, National Norms, and West Vancouver School District Scores

Group	\bar{X} T-Score	sd	n
Experimental	52.10	8.13	79
Conventional	53.40	9.13	62
Entire Sample	52.67	8.58	141
1980 National Norms	50.00	10.00	46000
1982 West Vancouver District Scores	52.26	8.16	206

It was noted that all but two of the 141 students in the study sample completed the Reading Comprehension Subtest.

Classification of Students into Reading Ability Levels

Initially subjects were to be classified as reading below, at and above grade level if they attained grade equivalent scores between 3.0 and 3.9, 4.0 and 4.9, and 5.0 or higher, respectively. However, discrepancies between

teacher estimates of reading ability and the grade equivalent scores attained on the Gates-MacGinitie Comprehension Subtest made it necessary to revise the ability ranges. Although the Gates Test clearly identified the low and high ability students, the scores of the better readers appeared inflated resulting in a grade equivalent range of 2.5 to 12.8. The revised grade equivalent ranges for the three ability levels reclassified students as performing:

1. below grade level, if they attained a grade equivalent score below 3.9;
2. at grade level, if they attained a grade equivalent score between 4.2 and 7.2; and
3. above grade level, if they attained a grade equivalent score of 7.5 and higher.

This adjustment resulted in a high degree of agreement between teacher estimates of the students' reading abilities and the reclassification of students according to the revised grade equivalent ranges; only 5 students, two in the conventional and three in the experimental group, attained grade equivalent scores that the teacher considered "out of character". Each of these five students, estimated by the classroom teachers as average or above average in reading ability, had performed well below their estimated grade level as estimated by the teachers and as compared to recent system-wide standardized testing (Canadian Test of Basic Skills). The classroom teachers

mentioned that the uncharacteristic student performance could have been attributed to emotional difficulties caused by family or personal problems. Data from these students were not included in the study. Also not included were students who were absent on the Final Recall Test and Gates-MacGinitie test days (4 students from the experimental group and 9 students from the Conventional Group).

After accounting for attrition due to uncharacteristic test scores and absenteeism on the Gates-MacGinitie test day and Final Recall Test day, the experimental instructional group was comprised of: 1) 18 below grade level readers (with a mean grade level score of 3.3 and a range of 2.7 to 3.8); 2) 46 at grade level readers (with a mean grade level score of 5.47 and a range of 4.2 to 7.1); and 3) 15 above grade level readers (with a mean grade level score of 8.9 and a range of 7.5 to 10.6). The conventional instructional group was comprised of: 1) 13 below grade level readers (with a mean grade level score of 3.2 and a range of 2.7 to 3.6); 2) 30 at grade level readers (with a mean grade level score of 5.49 and a range of 4.1 to 7.1); and 3) 19 above grade level readers (with a mean grade level score of 8.63 and range of 7.5 to 11.0). The high degree of similarity between the experimental and conventional groups indicates that the initial matching of schools appeared to control for differences in ability range.

Attendance Rates

Similarities in school attendance rate during the course of the investigation was also found between the treatment groups. The average attendance rate for the experimental group was 96% per student while the overall rate of attendance for the conventional group was 97% per student.

Years of Teaching Experience

Also similar was the mean number of years of teaching experience between the investigator and the conventional group teachers. The mean number of years of teaching experience for the six classroom teachers was approximately 9 years ranging from 1 to 30 years. The mean number of years of teaching experience for the three conventional group classroom teachers was approximately 4 years ranging from 1 to 5 years of experience. The three experimental classroom teachers had a mean of approximately 16 years of experience ranging from 9 to 30 years. The investigator who taught the experimental group had 4 years of teaching experience, which was the same mean number of years of teaching experience as the conventional group teachers.

Initial Test Recall

To determine if the groups initially differed in their ability to recall a headed expository prose passage, all students read the Initial Test Passage (*Termites*) and completed a written recall protocol one day later. The protocols were scored for quantity and organization. Two separate 2 X 3 (Group by Ability) analyses of ANCOVA were performed, one on the quantity and the other on the organization of the delayed written recall measures.

To ascertain if the assumptions of ANCOVA were satisfied, tests of the homogeneity of variance and of the regression coefficient were performed. The results from these tests show that in both analyses (quantity and organization) these assumptions were met ($p > .05$) [$F(5,13939) = 1.50$, $p > .05$ and $F(5,13939) = 2.15$, $p > .05$].

Results from the ANCOVA performed on the quantity and organization of recall are summarized in Table 6.

As can be seen from Table 6, there was no statistically significant mean difference between the experimental and conventional groups. As well, there were no significant main effect differences for Ability or for the Covariate. However, for both quantity and organization, there was a significant main effect for the Interaction of Group-by-Ability [$F(1,127) = 4.19$, $p < .05$ and $F(1,127) = 3.13$, $p < .05$, respectively]. The adjusted mean

Table 6: Analysis of Covariance Summary Table for Quantity and Organization of Recall on Initial Test

Source	SS	df	MS	F
QUANTITY				
Covariate	41.38	1	41.38	2.30
Group	21.86	1	21.86	1.21
Ability	95.83	2	47.92	2.66
Group X Ability	150.80	2	74.50	4.19*
Residuals	2285.09	127	18.00	
ORGANIZATION				
Covariate	156.30	1	156.30	3.56
Group	1.44	1	1.44	.03
Ability	91.93	2	45.96	.99
Group X Ability	291.27	2	145.64	3.13*
Residuals	5913.74	127	46.56	

* $p < .05$ level

scores of quantity for the three ability groups in the experimental group were 8.48, 11.84 and 12.06 for the below, at, and above average grade level groups, respectively. The three adjusted quantity mean scores in the conventional group were 6.37, 8.99, and 14.36. The adjusted mean scores of organization in the experimental group for the three ability levels were 11.31, 15.22, and 14.09 for the below, at, and above grade level groups. The

adjusted mean scores of organization in the conventional group for the three ability levels were 9.71, 12.07 and 18.16 for the below, at, and above grade level groups, respectively.

Figures 1 and 2 illustrate the interaction of Group-by-Ability for both dependent measures based on the adjusted mean scores. Referring to Figure 1 for the quantity of recall, the Group-by-Ability interaction appears to have occurred because the 'at-grade-level' and 'above-grade-level' subjects in the experimental group performed similarly and both scored higher than the below grade level group. However, it seems that subjects in the three ability levels in the conventional group scored differently from one another with the below grade level group scoring lowest, the at grade level group scoring higher and the above grade level subjects scoring the highest.

Referrring to Figure 2 for the organization of recall, the Group-by-Ability interaction appears to have occurred for the same reasons as for the quantity of recall interaction.

Analysis of the Final Testing

To test the six hypotheses delineated earlier in Chapter One, two separate 2X3 (Group X Ability) analyses of covariance (ANCOVA) were performed, one on the quantity and the other on the organization of delayed written recall.

Figure 1. Quantity Scores on Initial Recall Test by Group and Ability Levels

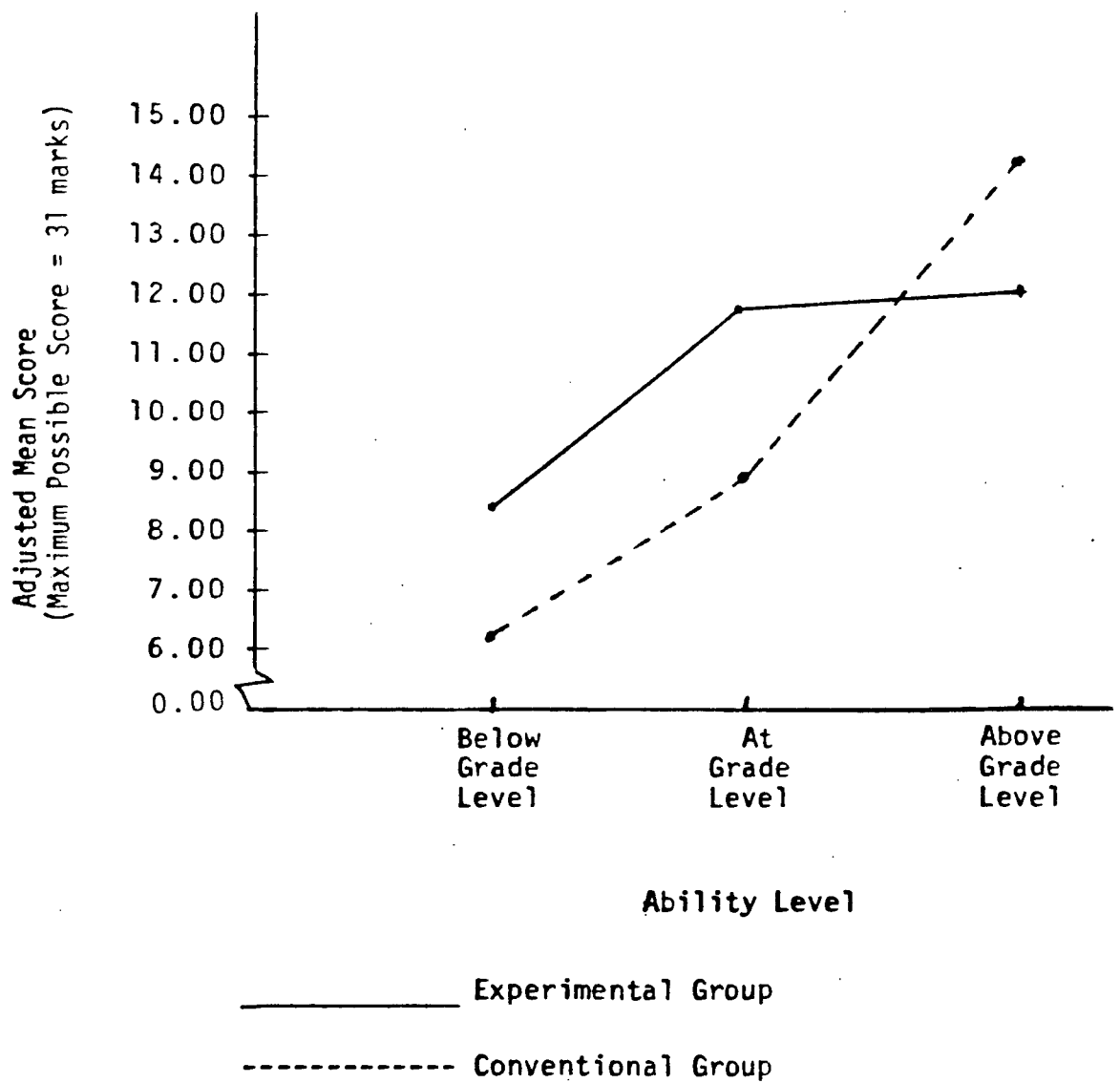
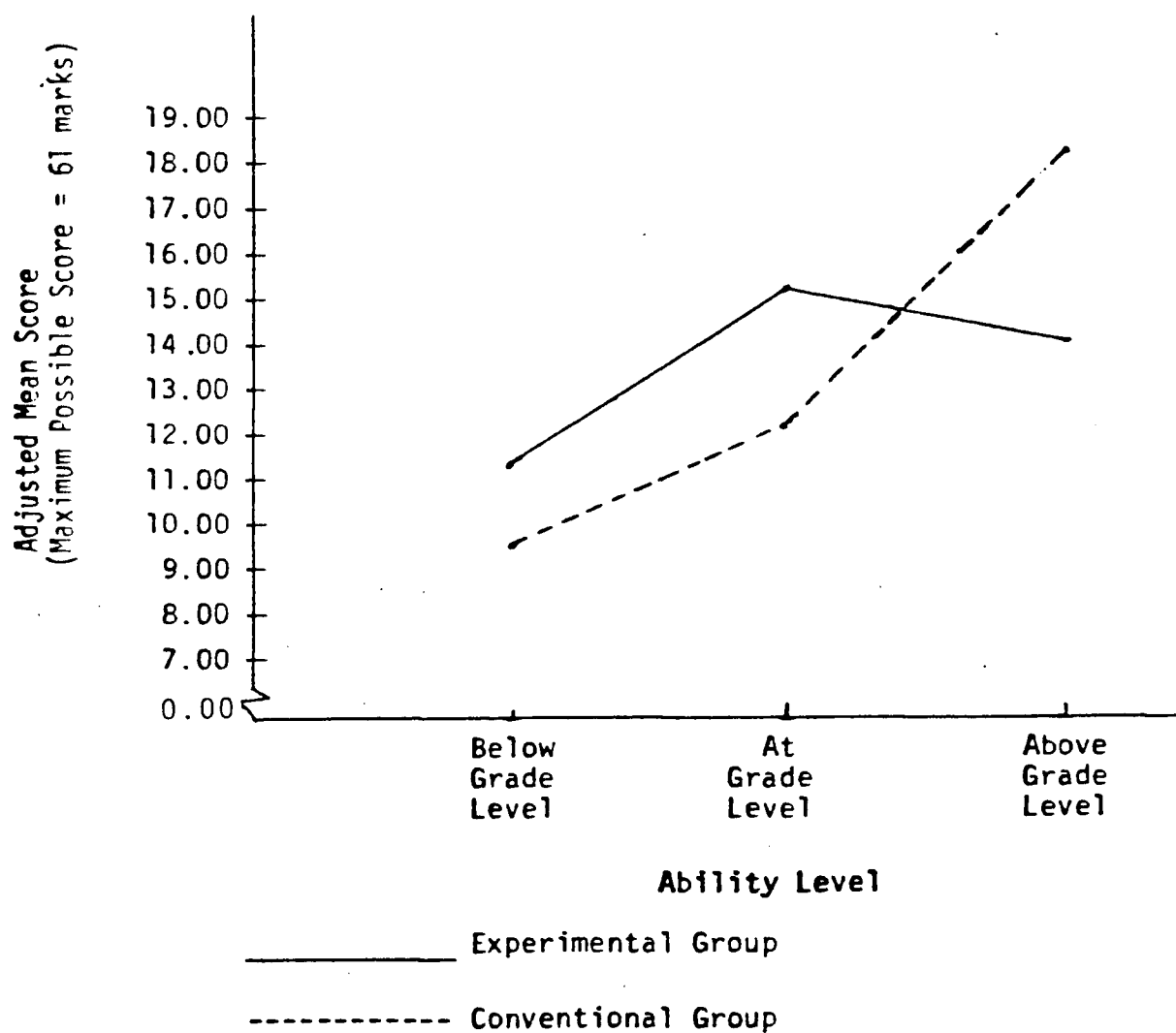


Figure 2 . Organization Scores on Initial Recall Test by Group and Ability Levels



To determine if the assumptions of the ANCOVA were satisfied, tests of homogeneity of variance and of the regression coefficient were performed. The results from these tests show that in both analyses (for quantity and organization) the assumption of the homogeneity of regression coefficient was met ($p > .05$) while the assumption of homogeneity of variance was not met ($p < .05$). The interpretation of the results from the two ANCOVA, therefore should take this into consideration.

Findings for Quantity of Recall Hypotheses

A restatement of each Null Hypothesis regarding the findings for quantity of recall will be followed by a presentation of the results.

Ho₁: For Quantity of Recall By Treatment

There will be no statistically significant difference between the treatment groups in their adjusted mean final-test performance on the quantity of delayed written recall.

Ho₂: For Quantity of Recall By Reading Ability

There will be no statistically significant effect for ability level on students' adjusted mean final-test performance on the quantity of delayed written recall.

Ho₃: For Interaction of Treatment by Reading Ability on the Quantity of Recall

There will be no interaction between student membership in both independent variable populations (treatment and reading ability) and their adjusted mean final-test performance on the quantity of delayed written recall.

Results from the ANCOVA performed on the quantity of recall are summarized in Table 7.

Table 7: Analysis of Covariance Summary Table for Quantity of Recall on Final Test

Source	SS	df	MS	<u>F</u>
Covariate	12.00	1	12.00	.49
Group	24.33	1	24.33	.95
Ability	168.83	2	84.42	3.30*
Group X Ability	96.25	2	48.12	1.88
Residuals	3432.33	134	25.61	

* $p < .05$ level

As can be seen from Table 7, there were no significant main effects for the Covariate, Group, or Group-by-Ability interaction ($p > .05$). The only significant finding from these analyses is the main effect from Ability [$F(2,134) = 3.30$, $p < .05$].

Table 8 presents the means, adjusted means and standard deviations for quantity of recall on the final test for the three ability groups.

Table 8: Means, Adjusted Means and Standard Deviations for Quantity of Recall on Final Test by Ability Levels

Ability Level		Experimental Group Means	Conventional Group Means	Marginal Means
Below Grade Level	Ob	5.82	5.00	5.41
	Ad	6.72	5.96	6.34
	sd	4.62	2.79	3.93
	n	(18)	(13)	(31)
At Grade Level	Ob	10.82	7.84	9.33
	Ad	10.83	7.85	9.34
	sd	4.28	4.26	4.49
	n	(46)	(30)	(76)
Above Grade Level	Ob	13.83	14.83	14.33
	Ad	12.97	13.97	13.47
	sd	7.42	6.93	7.06
	n	(15)	(19)	(34)
Group Means	Ob	10.16	9.22	
	Ad	10.17	9.26	
	sd	5.69	6.23	
	n	(79)	(62)	

Ob: Observed means

Ad: Adjusted means

sd: Standard deviations

n : Cell sizes

Note: Maximum possible score = 31 marks

Referring to Table 8 it can be seen that the adjusted mean scores of quantity for the three ability groups are 6.34, 9.34 and 13.47 for the below, at, and above grade

level groups, respectively. The post hoc Scheffé test shows that the 'above-grade-level' group performed significantly better than the 'at-grade-level' and 'below-grade-level' groups [$F(2,138)=15.65$; 32.18 , respectively, $p<.05$ in both cases]. The latter two groups performed similarly [$F(2,138)=7.69$, $p<.05$].

Figure 3 illustrates the main effect for the quantity of recall by the below, at, and above grade level students in the investigation.

Based on these findings for quantity of recall, Null Hypothesis 1, for Quantity of Recall By Treatment, and Null Hypothesis 3, For Interaction of Treatment by Reading Ability were accepted. Null Hypothesis 2, for Quantity of Recall by Reading Ability was rejected.

Findings for Organization of Recall Hypotheses

A restatement of each Null Hypothesis regarding the findings for organization of recall will be followed by a presentation of the results.

Ho₄: For Organization of Recall By Treatment

There will be no statistically significant difference between the treatment groups in their adjusted mean final-test performance on the organization of delayed written recall.

Figure 3. Quantity Scores on Final Recall Test by Ability Levels



Ho₅: For Organization of Recall By Ability

There will be no statistically significant effect for ability level on students' adjusted mean final-test performance on the organization of delayed written recall.

Ho₆: For Interaction of Treatment by Reading Ability on the Organization of Recall

There will be no interaction between student membership in both independent variable populations (treatment and reading ability) and their adjusted mean final-test performance on the organization of delayed written recall.

Results from the ANCOVA performed on the organization of recall are summarized in Table 9.

Table 9: Analysis of Covariance Summary Table for Organization of Recall on Final Test

Source	SS	df	MS	<u>F</u>
Covariate	16.68	1	16.68	.19
Group	1673.83	1	1673.83	18.75**
Ability	631.31	2	315.66	3.54*
Group X Ability	193.85	2	96.93	1.09
Residuals	11958.28	134	89.24	

** $p < .001$ level

* $p < .05$ level

As can be seen from Table 9, the significant findings from this analysis for organization of recall are the main effects of Group, [$F(1,134)=18.75$, $p<.001$], and the main effects of Ability, [$F(2,134)=3.54$, $p<.05$]. Table 10 presents the means, adjusted means and standard deviations for organization scores on the final recall test by ability groups.

Table 10: Means, Adjusted Means and Standard Deviations for Organizational Scores on Final Recall Test by Ability Levels

Ability Level		Experimental Group Means	Conventional Group Means	Marginal Means
Below Grade Level	Ob	11.69	7.35	9.52
	Ad	12.76	8.48	10.62
	sd	8.72	4.91	7.58
	n	(18)	(13)	(31)
At Grade Level	Ob	23.05	12.76	17.90
	Ad	23.06	12.77	17.91
	sd	9.52	8.19	10.29
	n	(46)	(30)	(76)
Above Grade Level	Ob	30.17	22.05	26.11
	Ad	29.14	21.04	25.09
	sd	12.59	10.93	12.21
	n	(15)	(19)	(34)
Group Means	Ob	21.64	14.05	
	Ad	20.65	14.10	
	sd	11.63	10.10	
	n	(79)	(62)	

Ob: Observed means

Ad: Adjusted means

sd: Standard deviations

n : Cell sizes

Note: Maximum possible score = 61 marks

Referring to Table 10 it can be seen that the adjusted mean scores of organization for the treatment group (20.65) is significantly higher than that of the conventional group (14.10). The adjusted mean scores on organization for the three ability groups are 10.62, 17.91, 25.09 for the below, at and above grade level groups, respectively. The post hoc Scheffé test shows that the 'above-grade-level' group performed significantly better than the 'at-grade-level' group [$F(2,138)=13.60$, $p<.05$] which in turn performed significantly better than the 'below-grade-level' group [$F(2,138)=13.12$, $p<.05$]

Figure 4 illustrates the main effect for the organization of recall by the below, at, and above grade level students in the study while Figure 5 illustrates the significant main effect for Treatment Group.

As can be seen from Figure 4 the good students appeared to organize their recalls better than the median group who in turn performed better than the below grade level students. Figure 5 illustrates the significant difference in the organization of written recall by the experimental group as compared to that of the conventional group.

Based on the analyses for organization of recall, Null Hypothesis 6, for Interaction of Treatment by Reading Ability was accepted. Null Hypothesis 4 for Organization of Recall by Treatment and Null Hypothesis 5 for Organization of Recall by Ability were rejected.

Figure 5. Organization Scores on Final Test by Group

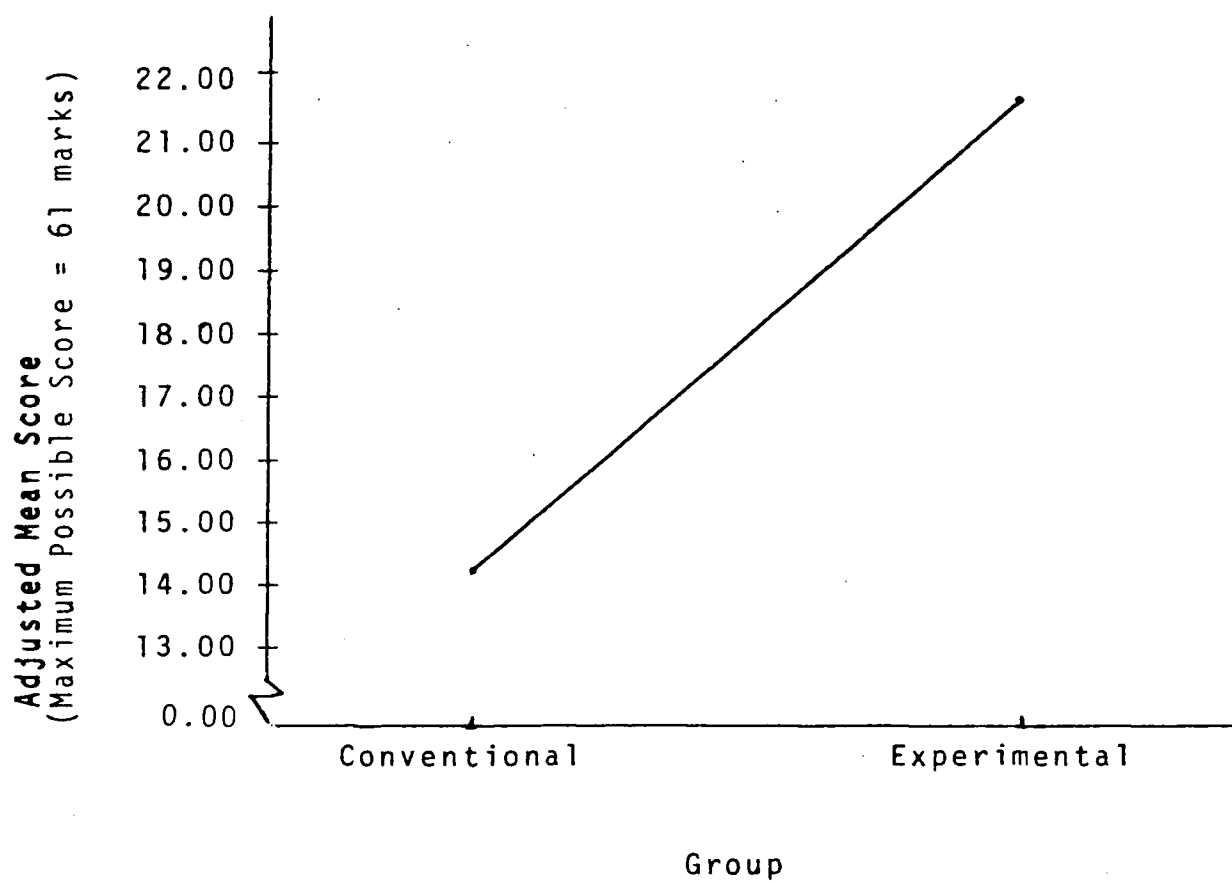
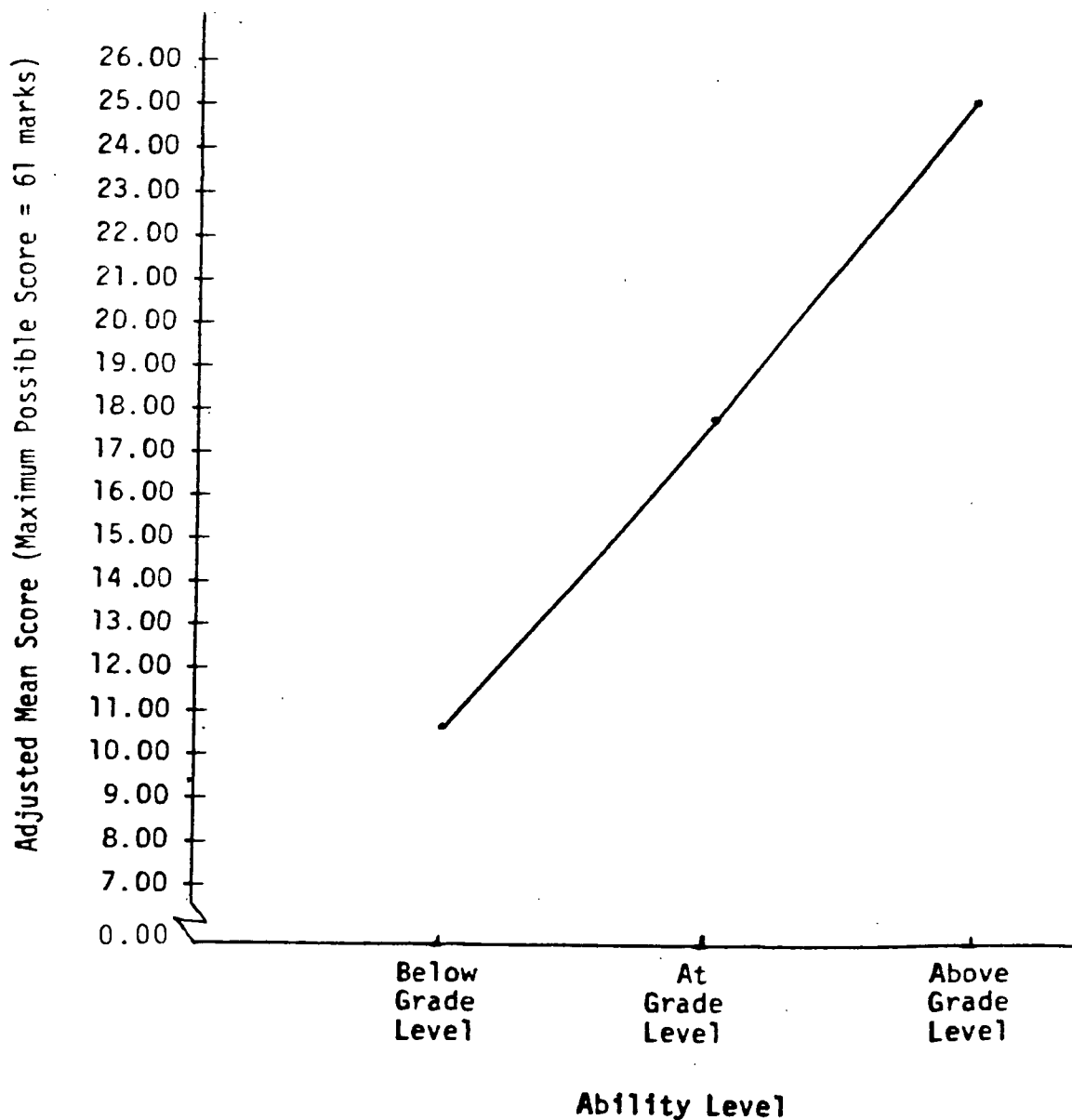


Figure 4. Organization Scores on Final Test by Group and Levels



Analyses of the Use of Headings By Group

Although headings were initially scored for organization only, it was conceivable that they could also have been scored for quantity. The nonsignificant findings for quantity of recall but significant findings for organization of recall by Group prompted an investigation to determine if there was a significant difference for recall of headings between the two groups on both the initial and final test. An ANOVA on the initial recall test revealed that the experimental group ($\bar{X}=.29$) did not recall significantly more headings than the conventional group ($\bar{X}=.32$, $p>.05$). However, with regard to the subjects' use of headings on the final test the ANOVA revealed that the experimental group ($\bar{X}=3.05$) performed significantly better than the conventional treatment group ($\bar{X}=.55$), [$F(1,132)=166.25$ $p<.001$].

Summary

The results presented in this chapter for initial testing found no significant differences between the conventional and treatment groups on measures of reading comprehension and initial quantity and organization of delayed written recall. The analyses of the final testing were conducted to determine the effect on recall of instructing fourth grade students to attend to text

structure and to use headings as an aid in retrieving and organizing written recall of expository prose passages.

Based on the results it was found that three Null Hypotheses were accepted (1, 3, and 6) while three were rejected (2, 4, and 5). Hypothesis 1, for Quantity of Recall by Treatment, was accepted because no significant differences were found between the quantity of ideas recalled by the conventional and experimental groups. Hypotheses 3 and 6, for Interaction of Treatment by reading Ability on the Quantity and Organization of Recall, were also accepted. No significant interactions were found for Group by Reading Ability level on either dependent measure.

Hypothesis 2, for Quantity of Recall by Reading Ability was rejected because a significant effect due to comprehension ability was found on the number of ideas recalled. The Scheffé post hoc test revealed that the better readers recalled significantly more than either the average or low ability students. Hypothesis 4, for Organization of Recall by Treatment, was also rejected because a significant difference was found in the organization of recall, with the experimental group outperforming the conventional group. Also rejected was Hypothesis 5 since a significant effect due to Reading Ability was found on the organization of recall. The Scheffé test indicated that the 'above-grade-level' readers organized their recall protocols better than the average readers, who in turn performed better than the low ability

readers. The analysis of the inclusion of headings in the final test of delayed written recall also revealed significant effects for treatment, with the experimental group including more headings in their protocols than the conventional group.

Chapter 5 will discuss the results of the data analysis presented in this chapter.

CHAPTER FIVE

SUMMARY, DISCUSSION, CONCLUSIONS, IMPLICATIONS AND LIMITATIONS OF THE STUDY

This chapter summarizes the study and brings together the findings, conclusions and implications of the investigation. The findings in Chapter 4 are discussed in light of previous research and in terms of the instructional paradigm of the study. Conclusions are drawn after the discussion of the results and implications for classroom instruction and further research are suggested.

Summary of the Study

This study sought answers to the following question:

Will direct instruction designed to train grade four students to be sensitive to the organization of information/classification prose and to use headings as recall aids affect the quantity and organization of written recall?

One hundred and forty-one fourth grade students from six intact non-streamed classes located in the Greater Vancouver area of British Columbia were involved in the study. The classes were paired on the basis of estimated

reading ability and socio-economic status and were randomly assigned to one of two treatment groups.

The experimental group, comprised of 79 students of low, average, and above average reading ability, received direct instruction from the investigator in the organization of descriptive prose and in the use of headings as retrieval and organizational aids for recall of ideas from information/classification expository passages. The passages had an average readability level of 3.4. The 62 students in the conventional group received instructions from their classroom teachers to read the same descriptive passages as used with the experimental group, and to answer and orally mark the answers to questions designed to highlight the macrostructure of the text.

Initial testing of all students just prior to the experiment involved classroom teacher administration of both the Gates-MacGinitie Reading Comprehension Subtest (Canadian edition, 1980) and an initial one-day-delayed written recall test of a headed expository passage. The Gates-MacGinitie comprehension test scores were used to:

1. classify students as reading below, at, or above grade level;
2. to determine if the groups differed in mean reading comprehension ability; and
3. as a covariate for the ANCOVAs conducted on the Initial and Final written recall quantity and organization scores.

The Initial Test of written recall was administered by the classroom teachers to determine if the treatment groups differed prior to instruction in their quantity and organization of recall after reading a descriptive expository passage.

The Final Test of one day-delayed written recall was administered by the classroom teachers at the end of the study to determine if training students to be aware of the hierarchical pattern of text ideas and to use headings for recall had an effect on the quantity and organization of the students' written recall. The passages used in both the Initial and Final Recall Tests were parallel in construction and had an average readability level of grade 3.1.

Discussion of Findings

Initial Testing

Results from the initial testing found no statistically significant mean differences between the experimental and conventional group mean scores for reading comprehension or for the quantity and organization of their delayed written recall. However, a significant interaction was found for Group by Ability; the high and average ability students in the experimental group scored similarly in the quantity and organization of ideas recalled and both groups out-performed the low ability students, while the

students of high ability in the conventional group performed better on both measures (quantity and organization) than the average students who, in turn, performed better than the low ability students. The low, average, and high ability students in the experimental group recalled 27, 38, and 40%, respectively, of the ideas presented in the text. The low, average and high ability students in the conventional group recalled 21, 29, and 46%, respectively, of the passage propositions. These findings seem to indicate that the good readers were better able to encode, retain, and reproduce more ideas from a passage of low readability than the poorer readers.

Final Testing

Six Null Hypotheses, three each for the Final Test dependent measures of quantity and organization, were delineated to statistically analyze the main effects of Treatment (Group), Ability and the possible Interaction of Treatment by Ability on fourth grade students' recall performance on the Final Test. Results of the statistical analyses for the dependent measure of organization will be discussed first since these seem to shed some light on the findings of the three hypotheses analyzed for the Quantity of Recall.

Discussion of the Findings for Organization of Recall.

Ho₄ stated that there would be no statistically significant mean differences in the organization of recall between treatment groups. This hypothesis was rejected because statistically significant differences in the organization of recall mean scores were found between treatment groups. As a group, the experimental subjects significantly out-performed the conventional subjects. This finding seems to indicate that training fourth grade students to be aware of the hierarchical organization of descriptive, expository passages and to use headings as organizational recall aids had a significant facilitative effect on the organization of written recall.

Ho₅ stated that there would be no significant main effect for Ability level. This hypothesis was rejected since a significant effect due to reading comprehension ability was found for the organization of recall. As indicated by the Scheffé test of multiple comparisons the above grade level readers in the study organized their recall protocols better than the average ability readers who, in turn, had better organized written recall than the below grade level students. This finding supports the findings of previous research which indicates that good readers are more likely to use the hierarchical organization of text structure to organize their written

recalls than students of low reading ability (Bridge and Tierney, 1981; Bridge, Tierney and Cera, 1978-79; McGee, 1982; Meyer, Brandt and Bluth, 1980; Taylor, 1980).

Ho₆ stated that there would be no statistically significant effect for Interaction between the Groups by Ability level on the organization of recall. This hypothesis was accepted since no interaction was found between Treatment Group by Ability Level. In contrast to Initial Testing, students in each experimental ability level consistently out-performed the students in each conventional ability level and in both treatment groups higher ability students performed better than average ability students who had better organization scores than low ability readers. Percentage scores for each group by ability show that the low, average, and high ability students in the experimental group achieved organization scores which reflected 21, 38, and 48% of the passage structure, respectively, while conventional group students in the low, average and high ability levels achieved organization percentages of 14, 21, and 34%, respectively. These results seem to indicate that training appeared to sensitize the experimental group to attend to the hierarchical organization of a descriptive prose passage and to use headings when structuring recall which in turn seemed to facilitate more organized remembrances of passage content. However, it was noted that the percentage difference in scores between the experimental group

students in the low, average and high ability levels as compared to the conventional group students in the low, average and high ability levels was 7, 17, and 14%, respectively. These percentage differences seem to indicate that training for the organization of recall may be more effective for students of average and high ability than for those of low ability.

Discussion of the Findings for Quantity of Recall.

Considering the significant findings for organization of recall by treatment group, the non-significant findings from statistical analysis of the Quantity hypotheses were unexpected.

H₀, stated that there would be no significant differences in the quantity of recall between treatment groups. This hypothesis was accepted since no significant differences were found between the quantity of ideas recalled by the conventional group and those recalled by the experimental group. A number of factors may have contributed to these non-significant findings.

Kintsch and van Dijk (1978) have indicated that "capacity limitations become crucial when it comes to the storage of information in memory and response productions" and that the nature of a selection strategy task may determine which ideas are encoded, retained and recalled (p. 364). It seems possible that the students in the experimental group, intent on organizing information under

headings, concentrated on remembering these units of organization at the expense of recalling the associated details. Or it may be that students at the grade four level may only be able to encode, recall and retain a certain number of concepts. Closer inspection of the recall protocols found that students in the experimental group included a significantly greater number of headings in their written recalls than those in the conventional group. The average number of headings recalled out of the five present in the Final Test passage was three for the experimental group as compared to one-half of a heading for the conventional group. Although headings were scored for organization only, it seems conceivable that had they been scored for quantity, the experimental group may have out-performed the conventional group in their amount of recall. Future researchers may do well to consider scoring headings for both quantity and organization.

Another possible explanation for the failure to find significant effects for instruction aimed at using headings to recall associated ideas may be that the strategy and the training tasks which required a multiplicity of processing skills (such as surveying headings, generation of alternate headings, identification and underlining of important information related to the headings and completion of hierarchical outlines of the macrostructure of the text) may be beyond the independent capabilities of grade four students. Although daily whole class guidance in the

utilization of headings to recall hierarchically related ideas appeared to enable the experimental classroom groups to recall an impressive amount of information from passages studied one day earlier, the students seemed to require a greater amount of guidance, direction and discussion when performing study tasks in semi-independent situations.

The temptation is to infer that failure to find a facilitative effect for training on the quantity of ideas recalled may have been due to the limited time that students had to integrate the study strategies. Although a longer training period may conceivably enable fourth grade students to independently use study strategies which would lead to increased recall of information, Baumann (1986) has pointed out that these reading strategies are late in developing. Stable's (1985) suggestion that study skills may be more effectively taught at the grade 6/7 level, since these students may be better at utilizing the abstract reasoning skills necessary to internalize such study skill strategies, seems to be warranted based on the findings of this study.

Ho₂ stated that there would be no statistically significant effect for Ability level on the quantity of ideas recalled. This hypothesis was rejected since a significant effect due to comprehension ability was found for the number of ideas recalled. A Scheffé post hoc analysis revealed that the better readers in the study recalled significantly more ideas than either the average or low ability students.

Ho₃ stated that there would be no statistically significant effect for interaction between the Groups by Ability level on the quantity of recall. This hypothesis was accepted since no interaction was found between treatment and ability level. In contrast to Initial Testing, the above grade level students from both groups recalled significantly more ideas than the at or below grade level groups while the latter two performed similarly. Percentage scores of each Group by Ability show that the low, average and high ability students in the experimental group achieved quantity scores which approximated 21%, 35% and 42%, respectively, of the total number of ideas in the Final Test passage. The conventional group students performed similarly to the experimental group students with the exception that the average group recalled less, but not significantly less, and the high ability group recalled more but not significantly more ideas than the experimental students. The low, average and high ability students in this group achieved quantity scores which approximated 19, 25 and 45%, respectively, of the total number of ideas in the Final Test passage.

These results seem to suggest that training for the use of headings and awareness of how expository prose is structured did not seem to facilitate increased recall of the ideas presented in the passage.

Conclusions, Implications, and Suggestions for Future Research

The results of this study seem to indicate that grade four students can be trained to be aware that descriptive prose is hierarchically organized, that headings can be used to recall information, and that training in the use of headings for recall seems to enhance the organization of recall. However, contrary to previous research (Doctorow, Wittrock, and Marks, 1978; Taylor, 1982, initial study) this training did not seem to increase the quantity of ideas recalled.

These findings have significant implications for classroom instruction. Although several researchers have suggested that students should be instructed in sensitization to text structure (Englert and Hiebert, 1983; Taylor, 1982) and should be trained to use headings to facilitate recall of expository prose (Brooks, Dansereau, Spurlin and Holley, 1983; Brown, Campione and Day 1981; Christensen and Stordahl, 1955; Herber, 1965, 1970; Jewitt, 1965; Niles, 1956; Meyer, 1984; Robinson, 1970; Robinson and Hall, 1941), it appears that the fourth grade students who may benefit most from instruction would be those who are reading at or above grade level. However, based on subjective evaluation of student performance, it appeared that even the average and high ability grade four students

in the investigation had difficulty using headings independently to increase recall. They also appeared to have difficulty generating alternate headings, identifying and underlining important facts in sentences and paragraphs, and completing hierarchical outlines. This seems to indicate that there may be a maturation process and/or a need for increased mental ability before students are able to use text structure and study skill strategies for independent, efficient recall of expository prose.

Although it appears that students at the grade four level, who are just beginning to "read to learn" do not seem to benefit greatly (in terms of the quantity of ideas recalled) from instruction in study skill strategies, it does seem that they would benefit from instruction which helps develop awareness of the differences between narrative and expository prose, of how texts are organized, and of how headings indicate text organization. As well, based on subjective observation of the students' difficulties with differentiating between important and unimportant passage information, teachers would do well to develop activities based on content area classroom texts which include: sorting disorganized word lists and sentence strips into hierarchical outlines, and the guided underlining of important ideas in sentences and single paragraphs. The findings of this study also suggest that instructional techniques such as word-sorting classification/categorization tasks, cut-up outline sorting

and use of headings as external organizational aids may have potential as a prelude for writing research reports.

Scope and Limitations of the Study

The concern of this study was to investigate if grade four students would be amenable to training in awareness of hierarchical organization of information/classification text structure and in the use of headings as aids to increase the quantity and organization of written recall of information/classification type passages. This study did not attempt to statistically examine the effectiveness of specific aspects of training (such as the various types of instructional procedures and circumstances to induce learning) but viewed the training-for-sensitization-process in its entirety.

The limitations of this study are:

1. The students in the sample were not randomly chosen;
2. The six schools used in this study were not randomly selected but were paired on the basis of estimated overall student reading abilities and socio-economic status and were then randomly assigned to either the experimental or conventional treatment groups;
3. The sample for the study was recruited from the Vancouver Catholic Public School System and may not be representative of all grade four students in the Vancouver Lower Mainland. The degree to which the sample is representative of Canadian elementary

students was determined by comparing their scores to the Canadian norms of the Gates-MacGinitie Test and to those of the West Vancouver School District.

4. The materials used in the study were written in the information/classification pattern of expository prose and were low in readability level. Therefore, the results may be best generalized to information/classification passages of low readability rather than to classroom instructional materials comprised of several expository prose patterns which are often written at higher readability levels. It should be noted, however, that the intention was to train students to recall ideas from information/classification passages of low rather than higher readability levels. Before expecting students to apply content area reading skills to classroom text materials, educators have suggested that such skills be initially taught by using "model lessons" and materials that do not present the learner with decoding difficulties but rather supply students with models and clear procedural formats for successful completion of the tasks being taught (Baumann, 1986; Pieronek, 1985).
5. The conventional group was instructed by the classroom teachers while the experimental group was trained by the investigator to ensure maximum test of the treatment and standardization of the lessons. The possibility exists that the significant results

obtained by the experimental group may have been because:

- a. one person (the investigator) taught the experimental group while three people (the classroom teachers) instructed the conventional group;
- b. the students in the experimental group may have found the lessons more intriguing and therefore may have been more motivated to learn than the conventional group students who were simply required to read, answer questions and correct answers on a daily basis.

Implications for Future Research

Based on the findings of the study the following recommendations can be made:

1. Future researchers may wish to consider scoring headings for both quantity and organization.
2. Future investigators may wish to conduct instructional studies dealing with the effects of training fourth grade students to use word-sorting categorization/classification tasks, cut-up outlines, and headings on their ability to produce well organized descriptive prose passages.

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**Appendix A: Initial and Final Test Passages – Standardized
Instructions for Administration of Tests**

Standardized Instructions for Administration of Tests

Directions for Written Recall: (name of passage)

Ensure that each child has a book to read prior to testing.

1. Hand out the lined paper.
2. Have students label the paper with name, grade and school.
3. Each different written protocol should be labelled with the date.
4. Use the following directions:

"Do your best to write down **everything** you can remember from the passage on (passage), which you studied yesterday. Don't worry about spelling. You will have up to 25 minutes to write. Please don't talk."

5. Have individual students paraphrase the directions. You may repeat the standardized directions until you feel certain each child understands.
6. Direct students:

"You may begin. When you have written everything you remember, turn your paper over and read your library book. Do you very best."

PLEASE REMEMBER TO COLLECT ALL the written protocols.

Protocols and study sheets will be collected by the investigators for analysis.

Standardized Instructions for Administration of Tests

PRIOR TO BEGINNING ensure that each child has a book to read. When they finish studying they should turn their papers over and read quietly.

Directions for Studying Passage: (name of passage)

1. Hand out the test passage face down.
2. EMPHASIZE THE IMPORTANCE OF THESE TESTS.
3. Use the following directions:

"When you turn the paper over you will have 15 minutes to read and study this passage. Use whatever will help you to remember it. You may write on the paper if you need to. Tomorrow you are going to be asked to write down **everything** you remember, exactly as you remember it."

4. Have individual students paraphrase the directions. You may repeat the standardized instructions until you feel certain each child understands.
5. Direct students to:

"Turn the passage over. Put your name, date and grade on the sheet. PAUSE. You may begin to study. If you need help reading a word put up your hand and I will help you."

PLEASE REMEMBER to collect all the study sheets and return them to their original envelope.

TERMITES

Ancient Insects

Few insects have been on earth as long as the termite family. Termites have been around for millions of years. These insects have hardly changed in all that time. Termites have always been about the same size as ants.

Natural Environment

Termites can be found in the warmer areas of the world. They live in Africa, Australia and many parts of the tropics. Some termites live underground. Some kinds live in wood. Others live in great piles of earth.

Termites in "Cities"

Termites live in nests that are similar to small cities. Different termites have different jobs. Each city or nest has a king and queen. They are the parents of all the other termites. Some termites are soldiers. Other termites are workers.

Changes in Appearance

Termites change in appearance as they grow. A termite sheds its skin several times. Each time a termite sheds it grows a little bit bigger. Young kings and queens have wings for a short time. They use them only once. They fly to a new home, then they lose their wings.

Harmful Habits

No matter where they make their homes, termites always do much damage. They eat paper and wood. They can eat through a book from cover to cover. Termites can eat tables and chairs. They can chew through the walls of a house. They can eat right through a tree. Once they move in it is extremely difficult to get rid of termites.

Name: _____

Date: _____

Grade: _____

PARROTS

The Parrot Family

Few birds are as interesting and beautiful as parrots. There are more than 700 kinds of birds in the parrot family. People like parrots because they can teach them how to talk. They are also admired for their bright colours.

Different Features

Parrots are very different from other birds. The parrot always has a large beak like a hook. This beak is very strong. The bird uses it to help him climb about. Parrots also use their feet to hold food and to help them climb.

Natural Environment

Parrots can be found in all the warmer parts of the world. South America and Australia have the greatest number of different kinds. Many of them nest in trees. Some nest in cliffs. Still others nest on the ground.

A Parrot's Cage

Of all the birds kept as pets, parrots seem to like cages the most. The parrot's cage should be large enough for him to move easily about without breaking his feathers. Now-a-days most cages are made of stainless steel. This metal is very strong and is easy to clean. Sand or gravel should cover the bottom of the cage. The cage should be cleaned once a week.

Feeding a Parrot

Parrots will eat nearly anything that is given to them. Many things are not good for them, though. They may eat some fruit, but not a lot. The best food for the parrot is a mix of seeds and nuts. Liquid vitamins should be added to the parrot's food. Following these simple rules will keep your parrot healthy and happy for many years.

Name: _____

Date: _____

Grade: _____

(adapted from Stables, 1985)

The Stables (1985) and Coulombe/Goble Versions of the Parrots Passage

Figure 2 Adapted by J. Goble and K. Coulombe
for use in their parallel study (1986)
conducted at the University of British
Columbia, Vancouver, B.C.

PARROTS

Figure 1 From R. Stables (1985) unpublished
Master's thesis, University of
British Columbia, Vancouver, B.C.

Parrots

Beautiful and Interesting Birds

Few birds are as interesting and beautiful as parrots. There are more than 700 kinds of birds in the parrot family. People like parrots because they can teach them to talk. They are also admired for their bright colours.

How Parrots are Different

Parrots are very different from other birds. The parrot always has a large beak like a hook. This beak is very strong. The bird uses it to help him climb about. Parrots also use their feet to hold food and to help them climb.

Parrots Live Where It is Warm

Parrots can be found in all the warmer parts of the world. South America and Australia have the greatest number of different kinds. Many of them nest in trees. Some nest in cliffs. Still others nest on the ground.

Parrots Like Cages More than Other Birds

Of all the birds kept as pets, parrots seem to like cages the most. The parrot's cage should be large enough for him to move easily about without breaking his feathers. Now-a-days most cages are made of stainless steel. This metal is very strong and is easy to clean. Sand or gravel should cover the bottom of the cage. The cage should be cleaned once a week.

Parrots Eat Nearly Anything

Parrots will eat nearly anything that is given to them. Many things are not good for them, though. They may eat some fruit, but not a lot. The best food for the parrot is a mix of seeds and nuts. Liquid vitamins should be added to the parrot's food. Following these simple rules will help keep your parrot healthy and happy for many years.

The Parrot Family

Few birds are as interesting and beautiful as parrots. There are more than 700 kinds of birds in the parrot family. People like parrots because they can teach them how to talk. They are also admired for their bright colours.

Different Features

Parrots are very different from other birds. The parrot always has a large beak like a hook. This beak is very strong. The bird uses it to help him climb about. Parrots also use their feet to hold food and to help them climb.

Natural Environment

Parrots can be found in all the warmer parts of the world. South America and Australia have the greatest number of different kinds. Many of them nest in trees. Some nest in cliffs. Still others nest on the ground.

A Parrot's Cage

Of all the birds kept as pets, parrots seem to like cages the most. The parrot's cage should be large enough for him to move easily about without breaking his feathers. Now-a-days most cages are made of stainless steel. This metal is very strong and is easy to clean. Sand or gravel should cover the bottom of the cage. The cage should be cleaned once a week.

Feeding a Parrot

Parrots will eat nearly anything that is given to them. Many things are not good for them, though. They may eat some fruit, but not a lot. The best food for the parrot is a mix of seeds and nuts. Liquid vitamins should be added to the parrot's food. Following these simple rules will keep your parrot healthy and happy for many years.

Appendix B: Scoring Procedures

Scoring Procedures (Quantity)

Each passage had 31 ideas including (5) macropropositions and (26) micropropositions. Scoring for quantity of ideas was unweighted; thus, macro and micropropositions were of equal value. The following procedures were used to assign full or part value to each idea recalled:

A. MACROPROPOSITIONS

Regardless of its position

1. Each complete macroproposition (original or paraphrased) was assigned a score of (1).

No matter where termites make their nests (1/2)

termites always do much damage (1/2) = (1)
(original, complete)

termites do much damage wherever they make their nests = (1) (complete, paraphrased)

Termites always do much damage = (1/2)
(partial)

Termites are very bad to have = (1/4)
(distortion)

No matter where termites make their nests they are very bad to have = (3/4)
(partial/distortion)

2. Distorted or partially reproduced macropropositions received appropriate partial scores (1/4, 1/2, 3/4).

B. INFERRED MACROPROPOSITIONS

The original *Parrots* passage as used by Stables contained one macroproposition, the gist of which could be inferred from related micropropositions. Since it was necessary that both tests be similar in structure, the *Termites* passage also contained one macroproposition which could be inferred from related micropropositions.

For example, if a student wrote:

Parrots like cages. The cages need to be cleaned once a week. They are made of stainless steel.

it could be inferred that the student recalled that *pet parrots are kept in cages.*

Likewise, if a student wrote:

Termite nests are like cities. Each nest has a king and queen ...

it could be inferred that the student recalled that *termites live in nests.*

When inferred, each of these two macropropositions received a score of (1/2).

C. MICROPROPOSITIONS

1. Each complete microproposition was assigned a score of (1). For example:

Young kings (1/4) and queens (1/4) have wings for a short time (1/2) = (1) (original, complete)

For a short time young kings and queens have wings = (1) (complete, paraphrased).

2. Distorted or partially reproduced macropropositions received appropriate partial scores. (1/4, 1/2, 3/4)

They have young queens = (1/4) (partial)

Termites have wings for a short time = (1/2) (partial)

Young queens (1/4) have wings for a short time (1/2) = (3/4) (partial)

Young kings (1/4) and queens (1/4) fly for a short time (1/4) = (3/4) (partial/distortion).

D. HEADINGS

Headings were not scored as ideas unless they paraphrased a complete or partial macroproposition or microproposition. For example, because the heading

Harmful Habits partially paraphrases the macroproposition *No matter where termites make their nests (1/2) they always do much damage (1/2)* it was assigned (1/2).

Because the heading **Wood Eating Insects** partially paraphrases the microproposition *They eat paper (1/2) and wood (1/2)* it was assigned (1/2).

Note:

Each macro or microproposition could receive a total score no greater than (1). Thus, any full or partial proposition which was repeated was to be scored only once.

Example:

Young kings (1/4) have wings for a short time (1/2)

Young queens (1/4) also have wings for a short time (1/2) = (1) (complete)

Scoring Procedures (Organization)

Each passage had a potential score of (61) for organization. Scores for organization were calculated using the following weightings and procedures:

A. MACROPROPOSITIONS

1. Regardless of its position each complete (original or paraphrased) macroproposition received a score of (5).
2. Distorted or partially reproduced macropropositions received appropriate partial scores ($1\frac{1}{4}$, $2\frac{1}{2}$, $3\frac{3}{4}$). (This was parallel to the procedures for scoring quantity.) For example:

*No matter where termites make their nest ($2\frac{1}{2}$) they always do much damage ($2\frac{1}{2}$) = (5)
(complete).*

*Termites always do much damage = ($2\frac{1}{2}$)
(partial)*

B. INFERRED MACROPROPOSITIONS

The original *Parrots* passage as used by Stables contained one macroproposition, the gist of which could be inferred from related micropropositions. Since it was necessary that both tests be similar in structure, the *Termites* passage also contained one macroproposition which could be inferred from related micropropositions.

For example, if a student wrote:

Parrots like cages. The cages need to be cleaned once a week. They are made of stainless steel.

it could be inferred that the student recalled that *pet parrots are kept in cages.*

Likewise, if a student wrote:

Termite nests are like cities. Each nest has a king and queen ...

it could be inferred that the student recalled that *termites live in nests.*

When inferred, each of these two macropropositions received a score of (2 1/2).

C. MICROPROPOSITIONS

1. Values assigned to complete, partial and distorted micropropositions followed the same procedures as used for determining quantity (1/4, or 1/2, or 3/4, or 1).
2. Micropropositions must have occurred in related clusters of at least two in order to be included in the organization score. That is, any two or more ideas from the same paragraph which were written consecutively were treated as a cluster. Microproposition clusters could consist of one macroproposition and one or more microproposition; or two or more micropropositions).

For example, the following protocol contains one cluster:

Termites are found in warmer places like Africa and Australia. They are about as little as ants. They have been around for millions of years. They like to live in wood.

This would be indicated on the protocol as the following:

() _____ () ()
 1. Few insects have been on earth as long
 { 5(/) (/) a) have existed for millions of years
 () () b) have hardly changed in that time
 4(/) (/) c) about as small as ants

() _____ , (/) (5)
 2. Termites are found in warmer parts of the world
 2(/) (/) a) Africa
 3(/) (/) b) Australia
 () () c) many parts of the tropics
 () () d) some live underground
 4(/) (/) e) some live in wood
 () () f) others live in great piles of earth

3. Only one cluster per section is scored. That is, if clusters of ideas from one section occur in two parts of the protocol, only the clusters of greatest value are scored. For example:

Termites are found in warm parts of the world such as the tropics. They are about as small as ants. Some live underground. Some live in wood.

() _____ () ()
 1. Few insects have been on earth as

long
 () () a) have existed for
 millions of years
 () () b) have hardly changed in
 that time
 3 (/) (✓) c) about as small as ants

() (/) (5)
 2. Termite are found in warmer parts
 of the world
 () () a) Africa
 () () b) Australia
 2 (/) () c) many parts of the
 tropics
 () () d) some live underground
 4 (/) (/) e) some live in wood
 () () f) others live in great
 piles of earth

4. Single micropropositions were not interpreted as reflecting any degree of organization and were scored (0).

C. HEADINGS

1. Each complete original or paraphrased heading was scored (2)

Damaging Insects = (2) (complete paraphrased)
Harmful Habits = (2) (complete)

2. Partial or distorted headings may be scored (1)

Harmful = (1) (partial)

3. Headings which paraphrase a macroproposition when no macroproposition is stated receive a score of up to

(5). Partial marks may be assigned if the full idea is not present (1 1/4, 2 1/2, 3 3/4).

Warm. Living Places = (5) (complete)
Harmful Habits = (2 1/2) (partial)

4. Headings which have no macro or micropropositions beneath them are scored (0).
5. Headings which are accompanied only by inappropriate micro or macropropositions are scored (0).
6. Headings which are accompanied by inappropriate and appropriate propositions are scored according to the above procedures, but only the appropriate propositions are scored. For example:

Termites Live in Nests = (5) (complete)

Termites have lived for millions of years = (0)

They are as small as ants = (0)

Their nests are like cities = (1) (complete)

Each nest has a king and queen = (1) (complete)
 = 7 (cluster)

() _____ (/) (5)
 3. {
 4(/) (/) a) nests are like cities
 () () b) different termites have
 different jobs
 5(/) (/) c) each nest has a king and
 a queen
 () () d) they are the parents of
 all the others
 () () e) some termites are
 soldiers
 () () f) others are workers

PARROTS TEMPLATE

- () () () 1. Few birds are as beautiful and interesting as parrots.
 () () a) More than 700 different kinds in parrot family
 () () b) People like them because they can teach them to talk
 () () c) They are also admired for their bright colors

- () () () 2. Parrots are different from other birds
 () () a) A large beak like a hook
 () () b) Very strong beak
 () () c) Uses his beak to help him climb about
 () () d) Use feet to hold food
 () () e) Use feet to help climb

- () () () 3. Parrots live where it is warm
 () () a) South America
 () () b) Australia
 () () c) South America and Australia have the greatest number of different kinds
 () () d) Many nest in trees
 () () e) Some nest in cliffs
 () () f) Still others nest on the ground

- () () () 4. Pet parrots are kept in cages
 () () a) parrots like cages more than other pet birds
 () () b) cage should be large enough to move easily without breaking feathers
 () () c) Cages are made of stainless steel now-a-days
 () () d) This metal is strong and easy to clean
 () () e) Sand or gravel should cover the bottom of the cage
 () () f) Cage should be cleaned once a week

- () () () 5. Parrots eat nearly anything given to them
 () () a) Many things are not good for them
 () () b) May eat some fruit, but not a lot
 () () c) Mix of seeds and nuts are best food for them
 () () d) Liquid vitamins should be added to the food
 () () e) Following simple rules keep parrots healthy
 () () f) Keep happy for many years

Partial Marks Guidelines

TERMITES TEMPLATE

- () () 1. Few insects have been on earth as long ^①
- () () a) have existed for millions of years ^①
- () () b) have hardly changed in that time
- () () c) about as small as ants ^(size)
- () () 2. Termites are found in warmer ^① parts of the world
- () () a) Africa ^①
- () () b) Australia ^①
- () () c) many parts of the tropics ^①
- () () d) some live underground ^①
- () () e) some live in wood ^①
- () () f) others live in great piles of earth ^①
- () () 3. Termites live in nests ^{Can be inferred for 1/2 marks}
- () () a) nests are like cities ^①
- () () b) different termites have different jobs ^①
- () () c) each nest has a king and a queen ^②
- () () d) they are the parents of all the others ^①
- () () e) some termites are soldiers ^①
- () () f) others are workers ^①
- () () 4. Change ^② in appearance as they grow ^②
- () () a) sheds its skin several times ^②
- () () b) each time it grows bigger ^②
- () () c) young king and queens have wings ^② for a short time
- () () d) use them only once ^①
- () () e) fly to a new home and lose their wings ^②
- () () 5. No matter where they make their nests, termites ^② always do much damage ^②
- () () a) they eat paper and wood ^②
- () () b) can eat through a book from cover to cover ^②
- () () c) can eat tables and chairs ^②
- () () d) can chew through the walls of a house
- () () e) they can eat right through a tree ^①
- () () f) difficult to get rid of termites

PARROTS TEMPLATE

- () () 1. Few birds are as beautiful and interesting as parrots. ^②
- () () a) More than 700 different kinds in parrot family ^②
- () () b) People like them/because they can teach them to talk ^②
- () () c) They are also admired for their bright ^① colors.
- () () 2. Parrots are different from other birds ^①
- () () a) A large beak like a hook ^①
- () () b) Very strong beak ^①
- () () c) Uses his beak to help him climb about ^①
- () () d) Use feet to hold food ^①
- () () e) Use feet to help climb ^① _(claws)
- () () 3. Parrots live where it is hot ^①
- () () a) South America ^①
- () () b) Australia ^①
- () () c) South America and Australia have the greatest ^② number of different kinds
- () () d) Many (nest) in trees ^①
- () () e) Some (nest) in cliffs ^①
- () () f) Still others (nest) on the ground ^① _{live}
- () () 4. Pet parrots are kept in cages ^① ^{Can be inferred for 1/2 marks}
- () () a) parrots like cages more than other pet birds
- () () b) cage should be large enough to move easily without breaking feathers ^②
- () () c) Cages are made of stainless steel ^② now-a-days
- () () d) This metal is strong and easy to clean ^②
- () () e) Sand/OF gravel should cover the bottom of the cage ^②
- () () f) Cage should be cleaned ^② once ^② a week
- () () 5. Parrots eat nearly anything given to them ^①
- () () a) Many things are not good for them ^②
- () () b) May eat some fruit but not a lot ^②
- () () c) Mix of seeds and nuts are best food for them ^②
- () () d) Liquid vitamins should be added to the food
- () () e) Following simple rules keep parrots healthy ^②
- () () f) Keep happy for many years ^②

Unedited Protocol Sample 1

Parrots

Parrots are very nice there are 700 kinds of Parrots. Pople love parrots because of the beautiful colors.

Parrots live Austrilla and S. Africa

Parrots seem to Love cages more than any other bird
A Parrots cage sould be very big For the parrot to move it
feather around A parrot sould have it cage clean Once a week
a least they sould have a mix of nuts and Parrot seed the bottom
of the cage shold be cover with sand or gravel (SEPCIEL Parrot Gravel
sould cover the bottom of the cage)

and you can find parrots in pet store too!!

You can find them at Lowhide mall in Burnaby!!

Quantity	Organization
----------	--------------

1 X

$$Q = 8\frac{1}{2} / O = 8\frac{1}{2}$$

Unedited Protocol Sample 2

Parrot's

Parrots Family

There are not many birds as beautiful as Parrots. There are 700 different kinds of parrots. People like parrots because they can be trained to talk. They also are admired for their color

Parrot's Environment

Feeding a Parrot

Parrots eat anything you give them. Some things are not good for them

Parrots Cage

A Parrot's cage should be large enough so that the Parrot can move around without breaking its feathers. Parrots' cages are made out of stainless steel. This material is easy to clean. A Parrot cage has sand or gravel on the bottom. A Parrot's cage should be clean once a week

Quantity
Organization
PARROTS TEMPLATE

- 1 (2) Parrots Family 2 (2) (2) 1. Few birds are as beautiful ~~and interesting~~ as parrots.
 3 (1) (1) a) More than 700 different kinds in parrot family
 4 (1) (1) b) People like them because they can teach them to talk
 5 (1) (1) c) They are also admired for their bright colors.

- () _____ () () 2. Parrots are different from other birds
 () () a) A large beak like a hook
 () () b) Very strong beak
 () () c) Uses his beak to help him climb about
 () () d) Use feet to hold food
 () () e) Use feet to help climb

- 6 ~~1~~ Parrot's Environment () () 3. Parrots live where it is warm
 () () a) South America
 () () b) Australia
 () () c) South America and Australia have the greatest number of different kinds
 () () d) Many nest in trees
 () () e) Some nest in cliffs
 () () f) Still others nest on the ground

- (infer)
 7 (2) Parrots Cage (2) (2) 4. Pet parrots are kept in cages
 () () a) parrots like cages more than other pet birds
 8 (1) (1) b) cage should be large enough to move easily without breaking feathers
 9 (1) (1) c) Cages are made of stainless steel now-a-days
 10 (2) (2) d) This metal is strong and easy to clean
 11 (1) (1) e) Sand or gravel should cover the bottom of the cage
 12 (1) (1) f) Cage should be cleaned once a week

- 13 (2) Feeding a Parrot 14 (1) (5) 5. Parrots eat nearly anything given to them
 15 (1) (1) a) Many things are not good for them
 () () b) May eat some fruit, but not a lot
 () () c) Mix of seeds and nuts are best food for them
 () () d) Liquid vitamins should be added to the food
 () () e) Following simple rules keep parrots healthy
 () () f) Keep happy for many years

$$Q = 10\frac{1}{2} / O = 24\frac{1}{2}$$

Unedited Protocol Sample 3

Parrots

The Parrot Family

around 700 kinds of parrots

admired because they could be taught to talk

also adire because of its bright color

Natural Environment

live warmer places

live in places like South America and Austarilla

build nest on trees, ground or caves

Cages

parrots like it more in cages

cages nowadays are made out of stainless metal which is very strong

wash cages once a week

Features

long beak

strong beak

beak helps it climb

feet help hold the food

What Parrot's Eat

eats almost anything

seeds, nuts added with liquid

if give you parrot fruit it will eat it but it will not be good the parrot

Quantity Organization
PARROTS TEMPLATE

- 1 (2) The Parrot Family () () 1. Few birds are as beautiful and interesting as parrots.
 2 (1) (1) a) More than 700 different kinds in parrot family
 3 (1) (1) b) People like them because they can teach them to talk
 4 (1) (1) c) They are also admired for their bright colors.

- 17 (2) Features () () 2. Parrots are different from other birds
 18 (X) (X) a) A ~~large~~^{long} beak like a hook
 19 (1) (1) b) Very strong beak
 20 (1) (1) c) Uses his beak to help him climb about
 21 (1) (1) d) Use feet to hold food
 () () e) Use feet to help climb

- 5 (2) Natural Environment 6 (1) (5) 3. Parrots live where it is warm
 7 (1) (1) a) South America
 8 (1) (1) b) Australia
 () () c) South America and Australia have the greatest number of different kinds
 9 (1) (1) d) Many nest in trees
 11 (X) (X) e) Some nest in ~~cliffs~~ caves
 10 (1) (1) f) Still others nest on the ground

- (infer)
 12 (2) Cages (1/2) (2 1/2) 4. Pet parrots are kept in cages
 13 (3/4) (3/4) a) parrots like cages more than other pet birds
 () () b) cage should be large enough to move easily without breaking feathers
 14 (1) (1) c) Cages are made of stainless steel now-a-days
 15 (1/2) (1/2) d) This metal is strong and easy to clean
 () () e) Sand or gravel should cover the bottom of the cage
 16 (1) (1) f) Cage should be cleaned once a week

- 22 (2) What Parrot's Eat 23 (1) (5) 5. Parrots eat nearly anything given to them
 () () a) Many things are not good for them
 26 (1/2) (1/2) b) May eat some fruit, but not a lot
 24 (1) (1) c) Mix of seeds and nuts are best food for them
 25 (X) (X) d) Liquid vitamins should be added to the food
 () () e) Following simple rules keep parrots healthy
 () () f) Keep happy for many years

$$Q = 17 \frac{1}{4} / O = 37 \frac{1}{4}$$

Appendix C: Instructional Procedures and Materials
(Conventional Group)

Instructional Procedures and Materials (Conventional Group)

Each lesson involves basically the same procedures. Students are to read a content passage and independently answer questions related to that passage. Please do not develop background or extension activities and do not call attention in any way to the paragraph headings.

Most lessons will follow the same sequence:

7. Distribute the completed question sheets from the previous day. Have students share their answers orally, marking and correcting their own written answers. (Accept any and all answers which are correct. It is not necessary for students to include all the points related to a question unless they do this naturally.) Students may not refer to original passage--this is to serve as a recall/review exercise.
8. Collect corrected question sheets before distributing next passage and questions.
9. Direct students to read the new passage and write answers to the questions.
10. Collect the passages and completed question sheets at the end of each lesson.

Lessons which do not exactly follow this sequence are as follows:

LESSON ONE: May 6

1. Students write delayed recall of "Termites."
2. AFTER recall is complete and collected, students independently answer questions on termites.
3. Collect completed question sheets to be marked orally on following day.

LESSON EIGHT: May 15

This is a special study day. PLEASE USE SPECIAL INSTRUCTIONS!

LESSON NINE: May 20

1. Redistribute questions completed) on ANIMALS' EYES.
2. Share answers orally and have students mark.

PLEASE REFER TO THIS SHEET AND YOUR INDIVIDUAL CALENDAR TO ENSURE THAT PROCEDURES ARE CORRECT.

Table C.1: Outline of Procedures for Conventional
Instruction Group

Session	Procedures
INITIAL TESTING	
Session 1	
A. Gates MacGinitie Reading Comprehension Test	A.M.: Classroom teachers administered Gates MacGinitie Reading Comprehension subtest (50 minutes).
B. Study of Initial Test passage on <i>Termites</i>	A.M.: Classroom teachers gave standardized instructions for study of <i>Termites</i> passage. Students silently studied <i>Termites</i> passage for up to 15 minutes.
Session 2	
A. One day delayed written recall of Initial Test passage on <i>Termites</i>	A.M.: Classroom teachers gave standardized instructions for written recall of <i>Termites</i> passage. Students had up to 25 minutes to write down everything that could be remembered from <i>Termites</i> passage.
INSTRUCTIONAL PROCEDURES	
Session 2	
B. Lesson 1	Students wrote answers to <i>Termites</i> passage questions.

Table C.1 continued

Session	Procedures
Session 3	
Lesson 2 <i>Grasshoppers</i>	Students orally marked <i>Termites</i> questions, read <i>Grasshoppers</i> passage, and wrote answers to <i>Grasshoppers</i> questions.
Session 4	
Lesson 3 <i>Riches From the Sea</i>	Students orally marked <i>Grasshoppers</i> questions, silently read <i>Riches From the Sea</i> passage, and wrote answers to <i>Riches From the Sea</i> questions.
Session 5	
Lesson 4 <i>Vikings of Denmark</i>	Students orally marked <i>Riches From the Sea</i> questions, silently read <i>Vikings of Denmark</i> , and wrote answers to <i>Vikings of Denmark</i> questions.
Session 6	
Lesson 5 <i>Fire Walkers</i>	Students orally marked <i>Vikings of Denmark</i> questions, silently read <i>Fire Walkers</i> , and wrote answers to <i>Fire Walkers</i> questions.
Session 7	
Lesson 6 <i>Animal Protection</i>	Students orally marked <i>Fire Walkers</i> questions, silently read <i>Animal Protection</i> passage, and wrote answers to <i>Animal Protection</i> questions.

Table C.1 continued

Session	Procedures
Session 8	
Lesson 7 <i>Horses</i>	Students orally marked <i>Animal Protection</i> questions, silently read <i>Horses</i> passage, and wrote answers to <i>Horses</i> questions.
Session 9	
Lesson 8 A. <i>Animals' Eyes</i>	Students orally marked <i>Horses</i> questions.
B. Practice study of <i>Animals' Eyes</i> passage	Classroom teachers gave standardized instructions for study of <i>Animals' Eyes</i> passage. Students silently studied <i>Animals' Eyes</i> questions during the 15 minute time allotment.
Session 10	
One day delayed practice written recall of <i>Animals' Eyes</i> passage.	Classroom teachers gave standardized instructions for written recall of <i>Animals' Eyes</i> passage. Students had up to 25 minutes to write down everything that could be remembered from <i>Animals' Eyes</i> passage.
Session 11	
Review Lesson 9	Students orally marked <i>Animals' Eyes</i> questions.

Table C.1 continued

Session	Procedures
FINAL TESTING	
Session 12	
Study of Final Test passage on <i>Parrots</i> .	A.M. Classroom teachers gave standardized instructions for study of <i>Parrots</i> passage. Students silently studied <i>Parrots</i> passage for up to 15 minutes.
Session 13	
One day delayed written recall of Final Test passage on <i>Parrots</i> .	A.M. Classroom teachers gave standardized instructions for written recall of <i>Parrots</i> passage. Students had up to 25 minutes to write down everything that could be remembered from <i>Parrots</i> passage.

LESSON 1

TERMITES

Ancient Insects

Few insects have been on earth as long as the termite family. Termites have been around for millions of years. These insects have hardly changed in all that time. Termites have always been about the same size as ants.

Natural Environment

Termites can be found in the warmer areas of the world. They live in Africa, Australia and many parts of the tropics. Some termites live underground. Some kinds live in wood. Others live in great piles of earth.

Termites in "Cities"

Termites live in nests that are similar to small cities. Different termites have different jobs. Each city or nest has a king and queen. They are the parents of all the other termites. Some termites are soldiers. Other termites are workers.

Changes in Appearance

Termites change in appearance as they grow. A termite sheds its skin several times. Each time a termite sheds it grows a little bit bigger. Young kings and queens have wings for a short time. They use them only once. They fly to a new home, then they lose their wings.

Harmful Habits

No matter where they make their homes, termites always do much damage. They eat paper and wood. They can eat through a book from cover to cover. Termites can eat tables and chairs. They can chew through the walls of a house. They can eat right through a tree. Once they move in it is extremely difficult to get rid of termites.

Name: _____

Date: _____

Grade: _____

LESSON 1 QUESTIONS

TERMITES

QUESTIONS

1. Why are termites called ancient insects?

2. In which parts of the world do termites live?

3. How do termites live?

4. During its life, how does a termite's appearance change?

5. Why are termites harmful?

Name: _____

Date: _____

Grade: _____

LESSON 2

GRASSHOPPERS

Appearance

Grasshoppers are green in colour. They have three pairs of long, strong legs. A grasshopper has two pairs of wings and one pair of antenna.

Movement

Grasshoppers can move in different ways. The grasshopper uses its long legs to jump high in the air. A grasshopper can also fly with its two pairs of wings. When it wants to get away fast, it hops.

Sounds

A grasshopper has no voice, but it can make sounds. A grasshopper can make sounds by rubbing its top wings together. It can also make a sound by rubbing a wing and a leg together.

QUESTIONS

1. What are some of the physical features of a grasshopper?

2. What are some ways that a grasshopper can move?

3. How does a grasshopper make sounds?

Name: _____

Date: _____

Grade: _____

LESSON 3

RICHERS OF THE SEA

Farming the Sea

Farming for food under the ocean may soon be possible. There is already much food growing under the water. Scientists hope to make new fishing grounds where the water is not too deep. This kind of "farming" will help feed many people.

Important Riches

Some of the most important riches found under the sea are oil and gas. Lots of rocks under the water have minerals in them. Rocks with copper and nickel are waiting for someone to scoop them up.

Sea Water

Sea water contains gold. In fact the sea holds about 7 trillion dollars worth of gold alone! All the minerals found on land are found in the sea. No one knows how to remove them quickly and cheaply.

Name: _____

Date: _____

Grade: _____

LESSON 3 QUESTIONS

RICHERS OF THE SEA

QUESTIONS

1. What new way of getting food may soon be possible?

2. What are some of the riches found in the sea?

3. What is important about the gold contained in sea water?

Name: _____

Date: _____

Grade: _____

LESSON 4

THE VIKINGS OF DENMARK

Leaving The Homeland

Many problems caused the Vikings of Denmark to leave home. The farmland was so poor that hardly any food could be grown. The people fought among themselves to get more land or a place to fish. Many people turned to the sea to find land and riches.

Dragon Ships

Viking war ships were often called "dragon ships". They had terrifying carved dragon heads on the front of them. Many ships were only as long as a large bus. They usually had one mast and one sail. These wooden ships were moved by oars.

Raiding

The Vikings planned their raids carefully. First they hid their boats. They attacked suddenly and left swiftly. The Vikings killed men, women and children. Some people were taken to be sold as slaves. Everything of value was carried off.

Changed by Christianity

The Vikings changed their ways when they learned about Christianity. Brave missionaries taught the Vikings about religion. Before long the Vikings gave up attacking other people. Many Vikings became good Christians.

Name: _____

Date: _____

Grade: _____

LESSON 4 QUESTIONS

THE VIKINGS OF DENMARK

QUESTIONS

1. Why did the Vikings leave their homeland? _____

2. What were the Viking war ships like? _____

3. How did the Vikings carry out a raid? _____

4. What happened to change the Vikings? _____

Name: _____

Date: _____

Grade: _____

LESSON 5

FIRE WALKERS

A Strange Practice

In some lands people have a strange practice of walking through fire. This practice is many centuries old. It is still done today.

Forms of Fire Walking

There are many ways to walk over fire. A barefoot person may walk quickly over coals. Sometimes a person must walk through a log fire or through hot ashes. Other times, the fire walker may cross over red hot stones. Or, ashes may be poured over his head in a fire bath.

Reasons For Fire Walking

There are many reasons why people fire walk. If a chief walks through fire and is not hurt it means that his people will have enough to eat. Other people walk through fire to show their strength. Sometimes a person must walk through fire to show that he did not commit a crime. If the person does not get burned he is set free.

A Mystery

It is a mystery that few fire walkers get burned. Maybe the fire walker strongly believes he will not get hurt. Or the fire walker may breathe in such a way that he does not feel pain. People have checked to see if fire walkers put something on their feet before walking through fire. None ever do.

Name: _____
Date: _____
Grade: _____

LESSON 5 QUESTIONS

FIRE WALKERS

QUESTIONS

1. What strange old custom is still practiced? _____

2. How is fire walking practiced? _____

3. Why do people walk through fire? _____

4. What is still unexplained about people who walk through fire? _____

LESSON 6

ANIMAL PROTECTION

Speed

Many animals can get away from enemies in a hurry. Some, like the deer can run very fast. Birds can fly away very quickly. Others, like squirrels and chipmunks are quick at climbing trees.

Teeth

Some animals use their teeth for protection. Dogs and wolves have long sharp teeth. Some small animals like rats and mink also have sharp teeth. The teeth of some animals such as elephants have become tusks. All these animals use their teeth against their enemies.

Claws

Claws protect some animals. Sometimes they use their claws in fighting other animals. Large birds such as eagles have strong claws. Wild cats like the tiger also use their claws.

Colour

Many animals use their colour for protection. Some birds are hard to see because they are the same colour as the trees. Toads are the colour of dirt. Some animals change colour. The rabbit is white in the winter. Some lizards turn the same colour as the ground or leaves they stand on.

Poison

Some animals use a poison to protect themselves. The sting of a bee or wasp has poison in it. Some spiders can poison larger animals so that they can not move. The sting ray is a fish that uses poison. A sting ray makes a very painful sore. Some snakes also use poison.

Name: _____

Date: _____

Grade: _____

LESSON 6 QUESTIONS

ANIMAL PROTECTION
QUESTIONS

1. What helps some animals escape from their enemies? _____

2. How can teeth be useful to animals? _____

3. How do some animals use their claws? _____

4. Why is colour sometimes a form of protection? _____

5. What use do animals make of poison? _____

Name: _____

Date: _____

Grade: _____

LESSON 7

HORSES

Horses of Long Ago

The first horses lived on the earth in the time of the dinosaurs. Then the horses were about the size of a fox. The meat-eating dinosaurs hunted them for food. When they were eating the horses had to watch out for danger.

Horses Changed

Over millions of years the horses changed. At first they had four toes on each front foot. They had three toes on each back foot. Now they have only one hoof on each leg. Their legs became longer. This helped them run away from danger.

Plant Eaters

Horses have always eaten plants. The first horses ate more leaves and fruit. Now a horse eats grass, hay and grain. Sometimes they have a carrot for a special treat. A horse has teeth made for grinding grasses. When a horse eats in a field it covers a lot of ground. It eats almost all day long.

The Way Horses Live

Some horses live in the wild and some horses are tame. Zebras and mustangs are wild horses. Wild horses stay together in big herds. Each herd has a leader. Tame horses have owners to feed and take care of them. Many owners have only one horse.

Useful Horses

Man has found many uses for horses. Cave men killed horses for meat. Horse skins have been used for clothes and tents. Later, men used horses for carrying heavy loads. Before there were cars, horses pulled wagons. Now they are used mostly for riding and racing.

Name: _____

Date: _____

Grade: _____

LESSON 7 QUESTIONS

HORSES

QUESTIONS

1. What were the first horses like? _____

2. How have horses changed? _____

3. What do horses eat? _____

4. What are some types of horses? _____

5. How have horses been useful to man? _____

Name: _____

Date: _____

Grade: _____

LESSON 8

ANIMALS' EYES

Amazing Sight

Each animal's eyes are special. The eyes help the animal get information. Animal's eyes are different because they need different information to live.

The Rabbit

The rabbit has eyes that see in a complete circle. A rabbit can look all around itself without moving its head. This helps the rabbit when it is being chased. The rabbit can watch where he is going and see his enemy behind him at the same time.

The Lizard

Some lizards have eyes that stick out. One eye can look back while the other looks ahead. The lizard's eyes help protect it from enemies. It can look for food with one eye and watch for trouble with the other.

The Owl

The owl's eyes can see at night. This helps it hunt for animals. From the branch of a tree the owl can see anything moving on the ground. Even small rats and mice can be seen in the dark by an owl.

The Toad

A toad's eyes help in eating. First the toad's eyes help it find its favourite food - worms. Then the eyes help the toad move food through its mouth. When the toad closes its eyes it can lower them through a door in the roof of its mouth. The eyes hold the slippery food still until the toad can swallow it.

Name: _____

Date: _____

Grade: _____

LESSON 8 QUESTIONS

ANIMALS' EYES

QUESTIONS

1. Why do different animals have different eyes? _____

2. What is special about the rabbit's eyes? _____

3. What is special about some lizard's eyes? _____

4. How are the owl's eyes useful? _____

5. What can a toad use his eyes for? _____

Name: _____

Date: _____

Grade: _____

**Appendix D: Instructional Procedures and
Materials (*Experimental Group*)**

Table D.1: Outline of Procedures for Experimental Instruction Group

Session	Procedures
INITIAL TESTING	
Session 1	
A. Gates MacGinitie Reading Comprehension Test	A.M.: Classroom teachers administered Gates MacGinitie Reading Comprehension subtest (50 minutes).
B. Study of Initial Test passage on <i>Termites</i>	A.M.: Classroom teachers gave standardized instructions for study of <i>Termites</i> passage. Students silently studied <i>Termites</i> passage for up to 15 minutes.
Session 2	
A. One day delayed written recall of Initial Test passage on <i>Termites</i>	A.M.: Classroom teachers gave standardized instructions for written recall of <i>Termites</i> passage. Students had up to 25 minutes to write down everything that could be remembered from <i>Termites</i> passage.
INSTRUCTIONAL PROCEDURES	
Session 2	
Lesson 1	
B. The Differences Between Narrative and Information Material	Students sorted narrative strips for <i>Goldilocks and the Three Bears</i> . Students sorted information strips for <i>Grasshoppers</i> .

Table D.1 continued

Session	Procedures
	<p>The differences between narrative and information material were discussed.</p> <p>The usefulness of headings was discussed.</p> <p>Students were shown how to use headings to remember associated details.</p> <p>Students studied headings and associated details for next day's recall task.</p>
Session 3	
Lesson 2	
Idea Sorting	<p>Students used recall of headings to aid in oral recall of <i>Grasshoppers</i> information studied the previous day.</p> <p>The referential and hierarchial relationship between headings and details was stressed.</p> <p>Students selected single headings from groups of related details and justified their selection.</p> <p>Students sorted cut-up outlines according to headings and details and justified their organization.</p> <p>Students were shown how to use headings to remember associated details.</p>

Table D.1 continued

Session	Procedures
Session 4	Students studied headings and associated details of a cut-up outline for next day's recall task.
Lesson 3	
<i>Riches From the Sea</i>	<p data-bbox="735 649 1195 778">Students used recall of headings to aid in oral recall of cut-up outline studied last day.</p> <p data-bbox="735 809 1276 962">Students were presented with and discussed a classroom chart of study strategies for recall of information material.</p> <p data-bbox="735 993 1253 1340">Students read <i>Riches From the Sea</i> passage, matched a cut-up outline to the text, and were guided in the application of study strategy procedures. This included the guided completion of a gloss-type hierarchical outline of headings, main ideas and details of the passage.</p> <p data-bbox="735 1371 1276 1496">Students were to study the <i>Riches From the Sea</i> hierarchical outline for the next day's recall task.</p>

Table D.1 continued

Session	Procedures
Session 5	
Lesson 4	
<i>Vikings of Denmark</i>	<p data-bbox="729 492 1231 711">Students used recall of headings to aid in oral recall of details from <i>Riches From the Sea</i>. The referential relationship between headings and ideas was discussed.</p> <p data-bbox="729 746 1214 840">Study strategy procedures for recall of information material were reviewed.</p> <p data-bbox="729 874 1249 1218">Students read <i>Vikings of Denmark</i> passage, matched a cut-up outline to the text, and were guided in the application of the study strategy procedures. This included the guided completion of a gloss-type hierarchical outline of headings, main ideas, and details of the passage.</p> <p data-bbox="729 1252 1275 1432">Students were to study the <i>Vikings of Denmark</i> hierarchical outline for next day's recall task. The use of headings as an aid to recall was stressed.</p>

Table D.1 continued

Session	Procedures
Session 6	
Lesson 5	
<i>Fire Walkers</i>	<p data-bbox="732 486 1275 895">Students used recall of headings to aid in oral recall of ideas from <i>Vikings of Denmark</i> passage. The referential relationship between headings and ideas was stressed. The hierarchical relationship between main ideas and details was discussed. Topic sentences (macropropositions) were identified with an asterisk.</p> <p data-bbox="732 932 1212 1022">Study strategy procedures for recall of information material were reviewed.</p> <p data-bbox="732 1058 1275 1304">Students read <i>Fire Walkers</i> passage, searched a list of details and alternate headings, and were guided in writing these pieces of information in a gloss-type hierarchical outline for the passage.</p> <p data-bbox="732 1340 1176 1461">Students were guided in identifying and marking topic sentences with an asterisk.</p> <p data-bbox="732 1498 1275 1745">Students were to study the <i>Fire Walkers</i> passage and hierarchical outline for next day's recall task. Use of headings and of self-checking of recall for passage information was demonstrated and stressed.</p>

Table D.1 continued

Session	Procedures
Session 7	
Lesson 6	
<i>Animal Protection</i>	<p data-bbox="733 486 1272 799">Students used recall of headings to aid in oral recall of ideas from <i>Fire Walkers</i> passage. Main ideas were starred with an asterisk. The referential relationships between headings and details and between main ideas and details were examined.</p> <p data-bbox="733 840 1214 927">Study strategy procedures for recall of information material were reviewed.</p> <p data-bbox="733 968 1272 1208">Students read the <i>Animal Protection</i> passage, and were guided in the completion of a gloss-type hierarchical outline for the passage. Students starred the main ideas of each passage section.</p> <p data-bbox="733 1248 1272 1492">Students were to study the <i>Animal Protection</i> hierarchical outline for next day's recall task. Use of headings and self-checking of recall for passage information were demonstrated and stressed.</p>

Table D.1 continued

Session	Procedures
Session 8	
Lesson 7	
<i>Horses</i>	<p data-bbox="739 486 1278 768">Students used recall of headings and macropropositions to aid in recall of ideas from <i>Animal Protection</i> passage. Main ideas were starred with an asterisk. The referential relationship between main ideas and details were reviewed.</p> <p data-bbox="739 805 1220 895">Study strategy procedures for recall of information material were reviewed.</p> <p data-bbox="739 932 1278 1148">Students read <i>Horses</i> passage. Headings were surveyed and students were guided in generative processing of alternative headings for each section of the <i>Horses</i> passage.</p> <p data-bbox="739 1185 1237 1304">Students discussed study techniques which would be most beneficial for recall of the <i>Horses</i> passage.</p> <p data-bbox="739 1340 1278 1622">Students were given 15 minutes to practice studying <i>Horses</i> passage. At the end of 15 minutes, students filled in a blank hierarchical outline of what had been read. Passage could be referred to for completion of the outline.</p> <p data-bbox="739 1659 1259 1808">Students were to study the <i>Horses</i> hierarchical outline for next day's recall. The use of self-checking was stressed.</p>

Table D.1 continued

Session	Procedures
Session 9	
Lesson 8	
A. Practice and review of efficient recall techniques.	<p>Students used recall of headings and Macropropositions to aid in recall of ideas from <i>Horses</i> passage. The referential relationship between headings and details was emphasized.</p> <p>Study procedures for recall of information material were reviewed. Students discussed most efficient way to use 15 minutes to study a passage.</p>
B. Practice study of <i>Animals' Eyes</i> passage	<p>Classroom teachers gave standardized instructions for study of <i>Animals' Eyes</i> passage.</p> <p>Students were given 15 minutes to silently study <i>Animals' Eyes</i> passage.</p>
Session 10	
One day delayed practice written recall of <i>Animals' Eyes</i> passage.	<p>Classroom teachers gave standardized instructions for written recall of <i>Animals' Eyes</i> passage.</p> <p>Students had up to 25 minutes to write down everything that could be remembered from <i>Animals' Eyes</i> passage.</p>

Table D.1 continued

Session	Procedures
Session 11	
Lesson 9	
Review Lesson	<p>Students examined samples of two protocols (one organized, one disorganized) written last day on <i>Animals' Eyes</i>.</p> <p>Students were guided in reorganization of disorganized passage.</p> <p>Study procedures were reviewed and most efficient and appropriate study procedures were discussed.</p>
FINAL TESTING	
Session 12	
Study of Final Test passage on <i>Parrots</i> .	<p>A.M. Classroom teachers gave standardized instructions for study of <i>Parrots</i> passage.</p> <p>Students silently studied <i>Parrots</i> passage for up to 15 minutes.</p>
Session 13	
One day delayed written recall of Final Test passage on <i>Parrots</i> .	<p>A.M. Classroom teachers gave standardized instructions for written recall of <i>Parrots</i> passage.</p> <p>Students had up to 25 minutes to write down everything that could be remembered from <i>Parrots</i> passage.</p>

Instructional Procedures and Materials(Experimental Group)

LESSON ONE (60 min.)

*THE DIFFERENCE BETWEEN INFORMATION MATERIAL
AND NARRATIVE MATERIAL*

I INTENDED LEARNING OUTCOMES:

The students will be able to:

- *sort narrative sequence strips*
- *sort information strips*
- *describe the difference between narrative and information material*
- *use headings to study for recall of details*
- *identify heading from a group of ideas*

II MATERIALS:

- *Class set of sequence strips for Goldilocks and the Three Bears*
- *Display sequence strips for Goldilocks and the Three Bears*
- *Class set of content strips for Grasshoppers*
- *Display strips for Grasshoppers*
- *2 pocket charts*
- *masking tape*
- *Chart: DIFFERENCES BETWEEN STORY AND INFORMATION MATERIAL (see example)*
- *felt pens*

III PROCEDURES:

A. NARRATIVE MATERIAL

1. Place *Goldilocks* story strips in disordered arrangement in the pocket chart.
2. Discuss:
 - a. "What are these strips all about?" (The story of *Goldilocks and the Three Bears*)
 - b. "Which strip would be the title?" (*Goldilocks and the Three Bears*).
 - c. "Does this make sense? What would you have to do to make it sensible?" (Put them in order).
 - d. Distribute *Goldilocks* sequence strip envelopes and direct students to arrange the ideas so they make sense.
 - e. Circulate and observe sorting. Students may work in pairs.
 - f. When students have finished sorting, call on individual students to tell how strips are sequenced. Display the strips sequentially in the pocket chart. Ask individual students to justify the placement of each idea. After all sequencing has been completed, ask: "Did anyone have to change the arrangement of their strips? What did you have to change? Why?"

B. INFORMATION MATERIAL

1. Place disordered *Grasshoppers* strips in the second pocket chart.
2. Discuss:

- a. "What is this all about? (*Grasshoppers*)."
 - b. "Is there one strip that could be a title?" (*Grasshoppers*).
 - c. "Does this make sense? Why not? What needs to be done?"
 - d. "Can you see any ideas that are more important than others?" (how a grasshopper moves, how a grasshopper makes sounds, a grasshopper's physical features).
3. Give the directions: "Open your envelope. Take the strips out and see if you can find all the ideas that go with these main ideas."
 4. Circulate and observe sorting. Students may work in pairs.
 5. Call on individual students to tell how ideas are organized. Display the organization in the pocket chart. Ask: "What details did you put with these main ideas?" Require that students justify their placement of ideas.
 6. Ask:
 - a. "What do we call these main ideas?" (headings).
 - b. "How did you arrange these ideas on your desk?"
 - c. "How could the strips be arranged so that the headings are easier to find?" (set heading to the left of the details).
 - d. "If I set these off to the side it is easier to see how the ideas fit together." e.g.

Heading

idea

idea

idea

Heading

idea

idea

idea

C. DISCUSS THE DIFFERENCE BETWEEN NARRATIVE AND INFORMATION MATERIAL

1. Ask:
 - a. "Which set of cards is a story? How do you know it is a story?"
 - b. "Which one is giving us information. How do you know this is not a story?"
 - c. "What makes it different from story material?"
2. Display chart for recording differences between narrative and information material.
 - a. Say: "Let's look at the differences between story and information material."
 - b. Teacher writes on board or on chart paper as students give answers to the following questions:

DIFFERENCES BETWEEN STORY AND INFORMATION MATERIAL

QUESTIONS	GOLDDILOCKS	GRASSHOPPERS
a) Why was the material written?	(enjoyment)	(information)
b) Describe how the material is written. How is the material organized?	(chronological, time sequence, sequence of events, etc.)	(title, headings, main ideas, details)
c) How do you read it?	(from beginning to end)	(only need to read the part that gives you the information)
d) In the information material what helps you find the details?		(headings)

D. THE USEFULNESS OF HEADINGS

1. Say: "Paying attention to the headings can also help you to remember information better. If I turn these details over and you turn yours over, could you remember the details that go with this heading?" (Do this for each section).

2. "Now study the headings silently. When you think you can remember them turn them over. See if you can remember each heading and the details that go with each." Have students orally recall the details that go with each heading.
3. Direct students to study the headings. Turn the display headings over and have students do the same. Have students orally recall the headings and details associated with each heading.
4. Say: "Tomorrow you will be asked to tell me the headings and details for *Grasshoppers*. You'll use the headings to remember the details for each section."

(Pieronck 1985)


~~She~~ has no voice

 She eats baby bear's porridge.

 She goes to sleep.


 Mother bear makes some porridge.


 The bears decide to go for a walk.

 They find Goldilocks.

 The porridge is too hot.

 The bears come home.

 She breaks baby bear's chair.


 She goes to the bears' house.


 Along comes Goldilocks.


 She runs away.

 Goldilocks and the Three Bears

(Pieronek, 1985)

 flies


 hops

 green in colour

 by rubbing its wings together


 three pairs of long strong legs

 jumps

 one pair of antennae

 how grasshoppers make sounds

 grasshoppers

 ways a grasshopper moves

 two pairs of wings

 by rubbing a wing and leg together

 a grasshopper's physical features

LESSON TWO (60 mins.): IDEA SORTING

I INTENDED LEARNING OUTCOMES:

The students will be able to:

- recall headings and details from *Grasshoppers* information strips studied previous day
- select a single heading from a group of related ideas
- sort up to eight 2 level cut-up outlines according to headings and details
- use headings to study for recall

II MATERIALS:

- pocket chart
- class set of eight cut-up outlines, each outline in an envelope, all eight bundled together (Catterson, 1966)
- *Grasshopper* display strips used last day
- Display strips used last day
- Display strips for eight cut-up outlines
- Class set of SORTING IDEAS worksheets

III PROCEDURES:

A. RECALL OF GRASSHOPPER INFORMATION

1. Direct students to think about what they studied on previous day.
2. Direct students to recall headings from the *Grasshoppers* selection.
3. Direct students to recall associated details for each heading of the selection. (Teacher displays heading strips and details strips in pocket chart as ideas are recalled).

4. Turn detail strips over again and remind students of how to use headings to recall details.
5. Have students retell the difference between narrative and information material (e.g. "What kind of material did we say this is? How is it different from story material?").

B. FINDING THE MAIN IDEA

1. Distribute worksheet SORTING IDEAS.
2. Direct students to read silently the first row of ideas to find the main idea.
3. Have one student read the ideas.
4. Direct student to underline the main idea.

Continue in the same fashion for the remainder of the worksheet.

C. IDEA SORTING

1. Direct students to open envelope #1 and to find the title for the ideas. Then direct students to sort the details under the appropriate headings.
2. Share and discuss arrangement of ideas. Visually display in pocket chart. Emphasize the way that ideas are related.
3. Turn details over and have students orally recall content using headings as cues for recall.

Follow steps 2 to 4 for as many of the 8 cut-up outlines as time permits. (Standardize the number of outlines per class). Before the sorting of subsequent

outlines, have students tell which steps they will use for organizing strips.

4. For final cut-up outline, follow the same procedures used for previous outlines. Then direct students to study the outline to be recalled the next day. Say: "Tomorrow you will be asked to use the headings to remember the ideas about (*title of final cut-up outline*)."

SORTING IDEAS

Name _____

Date _____

① CHOOSE THE MAIN IDEA FROM THESE IDEAS:

1. maple elm trees oak birch beech
2. shoes socks clothes sweater stockings blouse
3. horses animals sheep cows deer dogs
4. football hockey games tennis baseball
5. farmers firemen workers milkmen teachers
6. beef pork lamb mutton meat
7. rose tulip violet iris flowers daffodil

② WRITE THE MAIN IDEA FOR EACH GROUP:

1. boxes trunks drawers jars bottles _____
2. sailboat canoe rowboat liner _____
3. milk gas oil vinegar Coke water _____
4. collie terrier poodle sheepdog _____
5. apple grapefruit mango strawberry _____
6. overshoes slippers socks sandals boots _____
7. pansy forget-me-not tulip peony daisy _____

(Catterson, 1966)

1. Sweet things

1. dessert

1. cake

1. ice cream

1. pudding

1. Coca Cola

1. drinks

1. chocolate

1. Seven-Up

1. candy

1. lollipops

1. apple pie

2. oats

2. foods

2. grains

2. corn

2. wheat

2. rye

2. fruits

2. peaches

2. pears

2. apples

2. oranges

2. vegetables

2. carrots

2. peas

(Cameron '64)

3. clothes

3. for the feet

3. shoes

3. rubber boots

3. slippers

3. for the head

3. hats

3. caps

3. for the hands

3. gloves

3. mittens

4. living things

4. flying creatures

4. birds

4. insects

4. bats

4. plants

4. flowers

4. trees

4. bushes

4. fish

4. swimming creatures

4. eels

(Catherson '66)

5. furniture

5. sit on

5. to lay on

5. chairs

5. benches

5. stools

5. beds

5. couches

5. floor coverings

5. mats

5. rugs

5. carpets

5. tile

6. to wear

6. clothing

6. shoes

6. stockings

6. blouses

6. skirts

6. jewellery

6. rings

6. watches

6. bracelets

6. beads

6. earrings

(Catterson '66)

7. workers

7. indoors

7. grocer

7. butchers

7. tailors

7. outdoors

7. milkman

7. postman

7. lumberjack

7. clerks

7. typists

7. farmers

8. living things

8. in the sea

8. sharks

8. whales

8. seaweed

8. halibut

8. oysters

8. lobsters

8. on land

8. trees

8. lions

8. tigers

8. flowers

(Catterson '66)

LESSON THREE (60 mins.): RICHES OF THE SEA

I INTENDED LEARNING OUTCOMES:

The students will be able to:

- recall headings and details from the cut-up outline studied previous day
- read *Riches of the Sea* passage
- match cut-up outline to the text
- identify headings
- underline details in each paragraph of the passage
- record headings and details in side bar outline

II MATERIALS:

- *Living Things* display strips or final cut-up outline used on previous day
- pocket chart
- class set of *Riches of the Sea* passage
- Display cut-up outline for *Riches of the Sea*
- class set of cut-up outline for *Riches of the Sea*
- chart: STUDY PROCEDURES FOR INFORMATION MATERIAL

III PROCEDURES:

A. RECALL OF 'LIVING THINGS' INFORMATION

1. Direct students to think about what they studied on previous day.
2. Direct students to recall headings from the *Living Things* outline.
3. Direct students to recall associated details for each heading. (Teacher displays heading strips and detail strips in pocket chart.)

4. Turn detail strips over and remind students of how to use headings to recall details.

B. RICHES OF THE SEA

1. Distribute *Riches of the Sea* cut-up outline packets.
2. Distribute *Riches of the Sea* passage (face down).
3. Say: "Today you are going to learn how to read information material so that you can remember it."
4. Go over Study Procedures for Information Material chart.

HOW TO STUDY INFORMATION MATERIAL

Survey: Read the title and headings.

Read: the section that goes with each heading.

Write the heading. Do this for each section.

Go back and find the details for each section.

Study. (Practise remembering what goes with each heading.)

5. Have students turn passage over. Draw attention to the chart, guiding students through each study procedure step:
 - a. Direct students to survey the title and heading of the passage. Ask: "What three things will you find out about *Riches of the Sea*?"
 - b. Direct students to read each heading and section silently to find the cut-up outline heading for each section.

- c. Direct students to go back to the beginning of the passage. Have students silently read each section and find cut-up details for each section.
 - d. Circulate, discuss organization of ideas, and use pocket chart to display organization of cut-up outline.
6. Direct students to put cut-up outlines away.
 7. Direct students to read the passage, section by section, and to write the headings in the blank outline.
 8. Guide students to underline details for each section of the passage.
 9. Guide students in outlining the details associated with each heading, following the text section by section. If necessary, use the chalkboard to display how this is to be done.
 10. Direct students to study the outline, section by section, for the next day's recall task. Have the students practise remembering the details associated with each heading.

Riches of the Sea

copper and nickel

scientists hope to make shallow fishing grounds

oil and gas are the most important

Farming the Sea

this "farming" will feed many people

Important Riches

7 trillion dollars worth of gold

rocks with minerals

much food under water

all minerals found on land are found in the sea

sea water has gold

ocean farming may soon be possible

Sea Water

can't get minerals from sea water quickly and cheaply

RICHES OF THE SEA

Farming the Sea

Farming for food under the ocean may soon be possible. There is already much food growing under the water. Scientists hope to make new fishing grounds where the water is not too deep. This kind of "farming" will help feed many people.

Important Riches

Some of the most important riches found under the sea are oil and gas. Lots of rocks under the water have minerals in them. Rocks with copper and nickel are waiting for someone to scoop them up.

Sea Water

Sea water contains gold. In fact the sea holds about 7 trillion dollars worth of gold alone! All the minerals found on land are found in the sea. No one knows how to remove them quickly and cheaply.

Name: _____

Date: _____

Grade: _____

Name _____
School _____

RICHES OF THE SEA

H₁ _____

H₂ _____

H₃ _____

LESSON FOUR (60 min.): THE VIKINGS OF DENMARK

I INTENDED LEARNING OUTCOMES:

Students will be able to:

- recall headings and details from the cut-up outline studied previous day (*Riches of the Sea*)
- read *Vikings* passage
- match cut-up outline to *Vikings* passage
- identify headings
- underline details in each paragraph of the passage
- record headings and details in a side bar outline

II MATERIALS:

- *Riches of the Sea* display strips used last day
- 2 pocket charts
- class set of *The Vikings of Denmark* passage
- Display cut-up outline for *Vikings*. . .
- class set of cut-up outline for *Vikings*. . .
- chart: STUDY PROCEDURES FOR INFORMATION MATERIAL

III PROCEDURES:

A. RECALL TASK

1. Direct students to recall headings from *Riches of the Sea*.
2. Direct students to recall details.
3. Emphasize the relationship between headings and details and how headings can aid in the recall of details.

B. VIKINGS OF DENMARK

1. Distribute *Vikings of Denmark* cut-up outline packets.
2. Distribute *Vikings of Denmark* passage.
3. Use chart to review study procedures for information material.
4. Guide students through each study procedure step:
 - a. Direct students to survey title and headings. Then ask: "What 4 things will you find out about the Vikings of Denmark?"
 - b. Direct students to read each heading and section silently to find the cut-up outline heading for each section of the text.
 - c. Direct students to go back to the beginning of the passage.

Have students silently read each section to find cut-up outline details for each section.

Circulate, discuss organization of ideas and the relationship of the headings to the details. Use pocket chart to display organization of cut-up outline.
5. Direct students to put cut-up outlines away.
6. Guide students in underlining details in the first paragraph of the passage. After students underline the details say: "Now that we've looked at the details what is another way that the heading can be stated?" Continue this process for the remainder of the paragraphs.

7. Direct students to write the headings in the blank outline.
8. Direct students to write the details associated with each heading in the outline. If necessary, use the chalkboard to display how this is done. Say: "Try to think of each detail without looking at the passage. Check before you write them down."
9. Direct students to study the completed outline section by section for the next day's recall task. Have the students practise remembering the details associated with each heading.

Vikings (Goble / Coulombe '86)

Changed by Christianity

fighting for land and fishing places

some about as long as a bus

hid their boats

one mast and one sail

changed when they learned about Christianity

Dragon Ships

many became good Christians

killed men, women and children

turned to the sea to find new land and riches

left swiftly

moved by oars

made of wood

Vikings (Goble/Coulombe '86)

poor land , no food

war ships often called "dragon ships"

planned carefully

Vikings

attacked suddenly

gave up attacking people

all valuable things carried off

Leaving the Homeland

terrifying carved dragon heads on the front

many problems

Raiding

missionaries taught them religion

took some slaves

Name _____

School _____

LESSON FIVE (60 mins.): FIRE WALKERSI INTENDED LEARNING OUTCOMES:

The students will be able to:

- recall headings, main ideas and details from previous passage
- survey title, headings
- read passage *Fire Walkers*
- recognize alternate headings
- identify main ideas and describe relation to headings
- study headings and associated ideas for recall in next session

II MATERIALS:

- Display strips: *Vikings of Denmark*
- Pocket chart
- Class set: *Fire Walkers* passage; *Fire Walkers* outline

III PROCEDURES:

1. Direct students to recall headings from *Vikings of Denmark*; then recall details for each section. Emphasize the main idea or topic sentence in each and denote with an asterisk. (Have students state details in sentences.)
2. Distribute *Fire Walkers* passage and outline.
3. Review study procedures.
4. Direct students to survey title and headings. Discuss.
5. Draw attention to details and alternate headings at bottom of outline. (These are to be crossed off as they are used.)

6. Guide students through silent reading of each section and location of alternate heading to be recorded in outline.
7. When all alternate headings are recorded have students turn papers over.
8. Review remaining study procedures adding identification of main ideas with an asterisk (*).
9. Return to first section and guide students through locating main idea (to be starred in the outline) and associated details.
10. Continue guidance for each section until it is apparent that students can complete the task independently. Circulate and mark.
11. Direct students to study the passage and outline for recall in next session.

FIRE WALKERS

A Strange Practice

In some lands people have a strange practice of walking through fire. This practice is many centuries old. It is still done today.

Forms of Fire Walking

There are many ways to walk over fire. A barefoot person may walk quickly over coals. Sometimes a person must walk through a log fire or through hot ashes. Other times, the fire walker may cross over red hot stones. Or, ashes may be poured over his head in a fire bath.

Reasons For Fire Walking

There are many reasons why people fire walk. If a chief walks through fire and is not hurt it means that his people will have enough to eat. Other people walk through fire to show their strength. Sometimes a person must walk through fire to show that he did not commit a crime. If the person does not get burned he is set free.

A Mystery

It is a mystery that few fire walkers get burned. Maybe the fire walker strongly believes he will not get hurt. Or the fire walker may breathe in such a way that he does not feel pain. People have checked to see if fire walkers put something on their feet before walking through fire. None ever do.

Name: _____
Date: _____
Grade: _____

Name: _____
 Date: _____
 Grade: _____

Unusual Practice

- many reasons
- fire bath
- feet have been checked
- barefoot over coals
- to prove innocence
- over red hot stones
- they walk through fire
- to show strength
- centuries old
- still done

-many types of fire walking

-mystery that people don't get burned

-people don't put anything on feet

Types of Fire Walking

-chief finds out if people will have food

-person set free if not burned

-through a log fire or hot ashes

-maybe special breathing stops pain

A Question With No Answer

- some peoples have a strange practice

Why People Walk Through Fire

-may be strong beliefs

LESSON SIX (60 mins.): ANIMAL PROTECTIONI INTENDED LEARNING OUTCOMES:

The student will be able to:

- recall headings, main ideas and details from *Fire Walkers*
- review study procedures
- read *Animal Protection* passage
- complete a written outline to match text
- study for recall

II MATERIALS:

- Chalkboard
- Class set: *Animal Protection* passage

III PROCEDURES:

1. Direct students to recall title and headings for *Fire Walkers*. Record on board, leaving space for associated details.
2. Direct and record starred main idea and related details for each heading, one at a time. Review relation between headings and ideas.
3. Review study steps to date:
 - a. Survey title, headings
 - b. Read each section and record its heading (or similar headings) in outline
 - c. When all headings are recorded return to first section and note main idea (*) and details for one section at a time

- d. When outline is complete, study for recall
4. Distribute *Animal Protection* passage.
5. Guide students through each step using the passage.
Allow individual students to decide whether underlining
and recording in outline are required. Permit students
to complete final sections independently if they feel
able.
6. Direct students to study passage and/or outline for
recall on following day.

ANIMAL PROTECTION

Speed

Many animals can get away from enemies in a hurry. Some, like the deer can run very fast. Birds can fly away very quickly. Others, like squirrels and chipmunks are quick at climbing trees.

Teeth

Some animals use their teeth for protection. Dogs and wolves have long sharp teeth. Some small animals like rats and mink also have sharp teeth. The teeth of some animals such as elephants have become tusks. All these animals use their teeth against their enemies.

Claws

Claws protect some animals. Sometimes they use their claws in fighting other animals. Large birds such as eagles have strong claws. Wild cats like the tiger also use their claws.

Colour

Many animals use their colour for protection. Some birds are hard to see because they are the same colour as the trees. Toads are the colour of dirt. Some animals change colour. The rabbit is white in the winter. Some lizards turn the same colour as the ground or leaves they stand on.

Poison

Some animals use a poison to protect themselves. The sting of a bee or wasp has poison in it. Some spiders can poison larger animals so that they can not move. The sting ray is a fish that uses poison. A sting ray makes a very painful sore. Some snakes also use poison.

Name: _____

Date: _____

Grade: _____

LESSON SEVEN (60 mins.): HORSESI INTENDED LEARNING OUTCOMES:

The student will be able to:

- Recall headings, main ideas (*) and details from *Animal Protection* (oral)
- review study procedures
- identify main idea (*)
- read *Horses* passage
- record original or alternate headings in outline
- practise completing outline from recall
- study for recall

II MATERIALS:

- Chalkboard
- Class set: *Horses* passage, with outline folded under

III PROCEDURES:

1. Guide recall of *Animal Protection* recording on board (as in previous sessions).
2. Review study procedures. (Note that underlining is optional; each individual must decide what he can do in time allotted.)
3. Distribute *Horses* passage.
4. Direct students to survey and turn papers over. Recall.
5. Guide through first three (or more) sections writing original or appropriate alternate headings in outline.
6. Turn paper over. Fifteen minutes will be allotted to

study passage. Discuss best study techniques (survey, record headings, return and underline details, practise remembering).

7. At end of fifteen minutes direct students to turn papers over to outline and begin completing each section from recall.
8. When students can recall no more details they may complete outline by referring to passage.
9. Study to recall for next session.

HORSES

Horses of Long Ago

The first horses lived on the earth in the time of the dinosaurs. Then the horses were about the size of a fox. The meat-eating dinosaurs hunted them for food. When they were eating the horses had to watch out for danger.

Horses Changed

Over millions of years the horses changed. At first they had four toes on each front foot. They had three toes on each back foot. Now they have only one hoof on each leg. Their legs became longer. This helped them run away from danger.

Plant Eaters

Horses have always eaten plants. The first horses ate more leaves and fruit. Now a horse eats grass, hay and grain. Sometimes they have a carrot for a special treat. A horse has teeth made for grinding grasses. When a horse eats in a field it covers a lot of ground. It eats almost all day long.

The Way Horses Live

Some horses live in the wild and some horses are tame. Zebras and mustangs are wild horses. Wild horses stay together in big herds. Each herd has a leader. Tame horses have owners to feed and take care of them. Many owners have only one horse.

Useful Horses

Man has found many uses for horses. Cave men killed horses for meat. Horse skins have been used for clothes and tents. Later, men used horses for carrying heavy loads. Before there were cars horses pulled wagons. Now they are used mostly for riding and racing.

Name: _____

Date: _____

Grade: _____

LESSON EIGHT (2 sessions: 60 mins; 30 mins.): ANIMALS' EYESI INTENDED LEARNING OUTCOMES:

The student will be able to:

- recall headings, main ideas (*) and details from *Horses*
- review study procedures
- read and study *Animals' Eyes* in timed session (15 minutes)

II MATERIALS:

- Chalkboard
- Class set: *Animals' Eyes* passage

III PROCEDURES:

PART ONE

1. Guide and record oral recall of *Horses* on chalkboard.
2. Emphasize the relationship between details and headings.
3. Review study procedures and discuss most efficient use of limited time. (Most likely: Survey, record headings, return and underline, practise remembering. Some students will find underlining too slow in this timed session--they may be permitted to read without underlining.)
4. When each student has decided on the most efficient strategy distribute *Animals' Eyes* passage and allow fifteen minutes study time. (Use Standardized Instructions.)

PART TWO

1. On subsequent day allot twenty-five minutes for written recall of passage. (This session to be directed by all classroom teachers using Standardized Instructions.)

ANIMALS' EYES

Amazing Sight

Each animal's eyes are special. The eyes help the animal get information. Animal's eyes are different because they need different information to live.

The Rabbit

The rabbit has eyes that see in a complete circle. A rabbit can look all around itself without moving its head. This helps the rabbit when it is being chased. The rabbit can watch where he is going and see his enemy behind him at the same time.

The Lizard

Some lizards have eyes that stick out. One eye can look back while the other looks ahead. The lizard's eyes help protect it from enemies. It can look for food with one eye and watch for trouble with the other.

The Owl

The owl's eyes can see at night. This helps it hunt for animals. From the branch of a tree the owl can see anything moving on the ground. Even small rats and mice can be seen in the dark by an owl.

The Toad

A toad's eyes help in eating. First the toad's eyes help it find its favourite food - worms. Then the eyes help the toad move food through its mouth. When the toad closes its eyes it can lower them through a door in the roof of its mouth. The eyes hold the slippery food still until the toad can swallow it.

Name: _____

Date: _____

Grade: _____

LESSON NINE (30 min.): REVIEWI INTENDED LEARNING OUTCOMES:

The students will be able to:

- describe study procedures for information material
- discriminate between appropriate and inappropriate study procedures

II MATERIALS:

- chalkboard
- Example: protocol of *Animals' Eyes* (one organized passage and one disorganized passage)

III PROCEDURES:

1. Direct students to read the two protocols to determine which is better organized and easier to understand. Discuss.
2. Guide students through reorganization of disorganized passage. Teacher writes reorganized information on chalkboard.
3. Review study procedures. Emphasize:
 - a. Use of headings
 - b. Spending equal time on the study of each paragraph
 - c. Practising to remember what is associated with each heading.

EXAMPLE A (Grade 4)

Animals' Eyes

A lizard has eyes that stick out. A rabbit's eyes can see in a complete circle. The rabbit can see if an enemy is running behind him and he can also watch where he is going. An owl's eyes can see rats and mice moving on the ground in the dark. A toad's eyes can help him eat. Some lizards have one eye that can look back and one eye that can look forward. Animals' eyes help them to get information that they need to live. The owl's eyes can see at night. Each animal's eyes are special. The toad can use his eyes to hold onto a slippery worm until he can swallow it. Toads are green and brown and are good swimmers.

EXAMPLE B (Grade 4)

Animals' Eyes

Amazing Sight

Animals' eyes are special because they help the animals get information. This information helps animals to survive.

Lizard

Some lizards have eyes that stick out. A lizard can see forwards with one eye and backwards with the other. Another time a lizard could use one eye to look for food and the other eye to look for dangerous enemies.

Rabbit

A rabbit can see in a circle. It can look all around without moving its head. When it is being chased it can see where it's going and can see its enemy too.

Owl

An owl can see in the dark. The owl can hunt for food in the dark. It can even see small animals like the rat and mouse.

Toad

The toad has eyes that help it eat. First it finds its favorite food - worms. Then it puts the food in its mouth. His eyes drop down through a door in its mouth. The eyes hold the slippery food until the toad can swallow it.

**Appendix E: Sources Used in Constructing Instructional and
Test Passages**

Sources Used in Constructing Instructional and Test
Passages

Passage	Source
<i>Animal Protection</i>	Smith, N. B. (1977). <u>Be a better reader.</u> Prentice-Hall, p. 32.
<i>Animals' Eyes</i>	Dawkins, J.P. (1979). <u>ReadAbility.</u> Philadelphia: J.P. Lippincott.
<i>Grasshoppers</i>	Grover, C., & Anderson, G. (1960). <u>New practice readers.</u> Book A. Toronto: MacGraw-Hill Book Company.
<i>Fire Walkers</i>	Knight, D.C. (1976). <u>Bees can't fly: Things that are still a mystery to science.</u> New York: MacMillan Publishing Co. Inc., pp. 14-19.
<i>Horses</i>	Pluckrose, H. (Ed.). (1979). <u>Horses.</u> New York: Gloucester Press.
<i>Parrots</i>	Crowhurst, M. (1984). Seven unpublished expository passages. Vancouver, B.C.: University of British Columbia.
<i>Riches of the Sea</i>	Dawkins, J.P. (1979). <u>ReadAbility.</u> Philadelphia: J.P. Lippincott.

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