THE EFFECT OF PICTURES IN A VISUALLY
STRUCTURED LESSON ON THE COMPREHENSION AND RECALL OF
GRADE 5 AND GRADE 7 SOCIAL STUDIES TEXT

by

BONNIE JEAN McCOMB

B.Ed., University of British Columbia, 1985

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, 1987

© Bonnie Jean McComb, 1987
In presenting this thesis in partial fulfilment of the requirements for an advanced
degree at the University of British Columbia, I agree that the Library shall make it
freely available for reference and study. I further agree that permission for extensive
copying of this thesis for scholarly purposes may be granted by the head of my
department or by his or her representatives. It is understood that copying or
publication of this thesis for financial gain shall not be allowed without my written
permission.

Department of Language Education

The University of British Columbia
1956 Main Mall
Vancouver, Canada
V6T 1Y3

Date October 7, 1987
Abstract

The effects of instruction integrating pictorial and textual components in a fifth and a seventh grade Social Studies lesson were investigated. Measures of recall were examined both immediately after the lesson and after a two week delay. Experimental instruction focusing on the integration of illustrations with the expository text was compared to the more conventional classroom procedure of focusing on the written text through guided silent reading. The fifth grade experimental group outperformed the conventional group on all measures of immediate and delayed recall. The seventh grade experimental group had higher scores than the conventional group on one delayed measure of recall, a short answer test. No particular reading ability level was benefited more than another by the experimental treatment in either grade. An examination of gender differences revealed that fifth grade females in the experimental group outscored males on one immediate measure of recall, a short answer test. Implications for instruction and further research are discussed.
# TABLE OF CONTENTS

Abstract .............................................................................. ii  
Acknowledgement ................................................................. ix  

## CHAPTER I: INTRODUCTION ...................................................... 1

A. Statement of the Problem ....................................................... 1  
B. Rationale for the Study .......................................................... 1  
       Summary ........................................................................... 8  
C. Purpose of the Study ............................................................. 8  
D. Definitions ........................................................................... 13  
E. Assumptions .......................................................................... 14  
F. Significance of the Study ....................................................... 15  
G. Organization of the Thesis .................................................... 15  

## CHAPTER II: REVIEW OF THE LITERATURE ................................ 16

A. Picture Effect in Illustrated vs. Non-illustrated Text .................. 16  
B. Eye Movements and Picture Viewing Behaviour ...................... 29  
C. Visual Imagery Research ....................................................... 34  
D. Learning Theory and Application to Pictorial Instruction ........... 42  
E. Summary ............................................................................ 50  

## CHAPTER III: METHOD ............................................................ 56

A. Design and Data Analysis ....................................................... 56  
B. Selection of the Sample ......................................................... 58  
       1. Selection of Subjects ..................................................... 58
Z. School Selection .................................................. 60
3. Teachers ............................................................ 60
C. Instructional Materials ........................................... 61
  1. Teacher Instructional Handbooks .............................. 61
     a) Conventional Lesson Materials ........................... 61
     b) Experimental Lesson Materials .......................... 62
  2. Student Text Booklets .......................................... 67
     a) Grade 5 ..................................................... 67
     b) Grade 7 ..................................................... 68
  3. Testing Instructions Booklets for Teachers .................. 69
D. Testing Instruments .............................................. 70
  1. Standardized Measures ......................................... 70
     a) Gates-MacGinitie Reading Test (Grade 5) ................. 70
     b) Stanford Diagnostic Reading Test (Grade 7) .............. 72
  2. Non-Standardized Measures .................................... 73
     a) Multiple Choice Test ...................................... 74
     b) Short Answer Recall Test ................................ 75
E. Procedures ....................................................... 76
  1. Pilot Study ..................................................... 76
  2. Main Study ..................................................... 78
     a) Lesson and Immediate Testing ............................ 78
     b) Delayed Testing ........................................... 79
     c) Collection of Standardized Reading Scores ................ 80
d) Scoring .................................................. 80

CHAPTER IV: RESULTS ........................................... 84
A. Standardized Measures ...................................... 84
   1. Gates-MacGinitie (Grade 5 reading scores) .............. 84
   2. Stanford Diagnostic (Grade 7 reading scores) ........... 85
B. Scoring Reliability .......................................... 86
C. Hypotheses and Results of Non-Standardized Measures .... 89
   1. Analysis of Data for Grade 5 .......................... 89
   2. Analysis of Data for Grade 7 ......................... 102

CHAPTER V: SUMMARY, LIMITATIONS, CONCLUSIONS, IMPLICATIONS .... 115
A. Summary .................................................. 115
   1. Purpose .............................................. 115
   2. Rationale ............................................ 115
   3. Method ............................................... 116
   4. Discussion of Results ................................ 117
      a) Grade 5 ........................................... 117
      b) Grade 7 ........................................... 118
      c) Both samples .................................... 119
B. Limitations .............................................. 121
C. Conclusions ............................................. 122
   1. Grade 5 ............................................. 122
   2. Grade 7 ............................................. 123
LIST OF TABLES

Table 1: Grade 5 Non-Standardized Test Means for Each Treatment Group ..........................................................90
Table 2: Summary of Treatment Effect Results for Grade 5 ...............90
Table 3: Effect of Treatment on Reading Ability Levels -
Grade 5 ..........................................................................................................................91
Table 4: Cell Means for Reading Ability Groups on Multiple Choice Tests - Grade 5 ......................................................92
Table 5: Cell Means for Reading Ability Groups on Short Answer Tests - Grade 5 ..............................................................93
Table 6: Treatment Effect on Gender Performance - Grade 5 ...............94
Table 7: Cell Means for Treatment Condition by Gender - Grade 5 ......95
Table 8: Grade 7 Non-Standardized Test Means for Each Treatment Group ..........................................................103
Table 9: Summary of Treatment Effect Results for Grade 7 ...............103
Table 10: Effect of Treatment on Reading Ability Levels -
Grade 7 ..........................................................................................................................104
Table 11: Cell Means for Reading Ability Groups on Multiple Choice Tests - Grade 7 ..............................................................105
Table 12: Cell Means for Reading Ability Groups on Short Answer Tests - Grade 7 ..............................................................106
Table 13: Treatment Effect on Gender Performance - Grade 7 ...............107
Table 14: Cell Means for treatment Condition by Gender - Grade 7....108
LIST OF FIGURES

Figure 1: Grade 5 experimental treatment - visually structured lesson: one picture example .......................................63

Figure 2: Grade 5 control treatment - guided reading lesson: one text section example ...........................................64

Figure 3: Grade 7 experimental treatment - visually structured lesson: one picture example .......................................65

Figure 4: Grade 7 control treatment - guided silent reading lesson: one text section example ...........................................66

Figure 5: Grade 5 short answer recall test - question types and scores .................................................................82

Figure 6: Grade 7 short answer recall test - questions types and scores .................................................................83

Figure 7: Summary of Gates-MacGinitie t-scores for grade 5 ..........87

Figure 8: Summary of Stanford Diagnostic grade equivalent scores for grade 7 ..........................................................88
Acknowledgements

I am extremely grateful for the encouragement and support of members of the Language Education Department during the process of conducting and reporting this research. In particular I should like to express my thanks to Dr. Florence Pieronek whose thoughts regarding illustrations and content area reading provided the initial frame of reference for this study, and whose patience, humour, and advice provided continuing focus. Dr. Victor Froese's insightful suggestions relating to data analysis and the organization of the thesis have been most helpful. Dr. Ronald McGregor's comments regarding eye movement research have been much appreciated. As well, Dr. Jane Catterson has kindly provided useful suggestions concerning the design of the study.

I should also like to thank Dr. Nand Kishor and Dr. Harold Ratzlaff for their kind and patient guidance in the area of measurement, design, and statistical analysis.

In addition, Mr. Alan Moodie of the Vancouver School Board has been of the utmost help in arranging the study. The kindness and cooperation of the principals and teachers involved in the study, too, has been exemplary.

Finally, the counsel and encouragement of friends and family, particularly my husband, are gratefully acknowledged.
CHAPTER I: INTRODUCTION

A. Statement of the Problem

This study examines the question of whether or not pictures in Social Studies textbooks could serve a facilitative function on comprehension and recall of text passages. Would students who are required to process the pictures in their Social Studies textbooks in a structured manner achieve better comprehension and recall than those who pay only incidental attention to the pictures? More specifically, would those students who receive structured questions focusing on both pictures and connected prose perform better on measures of comprehension and recall than those students who receive guided questions focusing on the connected prose only?

B. Rationale for the Study

Considerable research has been directed towards the effects of pictures through the comparison of illustrated versus non-illustrated texts (Borges & Robins, 1980; Covey & Carroll, 1985; Duchastel, 1980; Hayes & Readance, 1983; Joseph & Dwyer, 1969; Levie & Lentz, 1972; Levin, Shriberg, & Berry, 1983) and towards the nature of picture viewing behaviour (Haber, 1970; Flagg & Weaver, 1981; Kaufman & Richards, 1969; Loftus, 1971; Neisser, 1968; Nesbit, 1981; Pribram, 1969; Tversky, 1974).
A great deal of research has also been focused on visual imagery processes (Anderson & Kulhevy, 1972; Craik & Lockhart, 1972; Kaufman, 1979; Kosslyn, Holyoak, & Huffman, 1976; Paivio, 1969; Reese, 1970; Rohwer, 1970) and on aspects of learning theory (Berry, 1980; Bradshaw & Nettleton, 1981; Hittleman, 1985; Luria, 1973). Although a need for picture-related instruction has been recognized, very few studies have been concerned with developing methods of instruction which will enhance the effective use of illustrations (Brody, 1984; Snowman & Cunningham, 1975). While it has been established that pictures may serve as aids to comprehension and recall, in the light of knowledge about imagery and learning theories, a number of instructional aspects related to picture/text instruction should be addressed in order to ensure that pictures do function effectively. These include: guaranteed picture processing, visual and verbal integration, preliminary visual presentation, and grade level to which instruction is directed.

For many years reading methologists have suggested that from grade 4 upwards children need to learn to read their textbooks (Herber, 1970; McKee, 1948; Spache & Spache, 1973; Summers, 1965). One of the most common characteristics of the instructional textbooks in use from the intermediate grades up, apart from the presence of extensive prose passages, is the inclusion of various types of pictorial illustrations.

It has been suggested that pictorial aids offer an important adjunct in prose comprehension. For example, some research investigating the contribution of pictures to comprehension indicates at least a modest positive effect (Borges & Robins, 1980; Bluth, 1972; Covey & Carroll, 1985; Rankin & Culhane, 1970; Royer & Cable, 1976; Wardle, 1977), while
others have found pictures aid retention more in delayed than immediate recall (Borges & Robins, 1980; Dwyer, 1980; Haring, 1982; Hayes & Readance, 1983; Levin, Shriberg, & Berry, 1983; Rusted & Coltheart, 1979).

Studies have been conducted to determine the nature of students' picture viewing behaviour. Loftus (1971) found that it was the number of eye fixations, regardless of value given to a picture and of length of time exposure, that determined memory performance. Summers (1965) suggests that the kind of directions given at the time subjects look at pictures clearly influences the perceptual pattern and length of fixations. Based on a study conducted by Friedman (1969) it is pointed out that much research has indicated people normally notice only the global aspects of a picture, and fail to attend to and encode most of the detailed features. It has been suggested that although most students probably do look at text illustrations in most situations, they usually do not "study" the pictures unless prompted to do so (Levie & Lentz, 1982). Many students may simply not view pictures as serious sources of information. Nichols (1983) draws attention to this shortcoming and points out that a picture can function as the basis of a most effective lesson.

In effect, it appears that it is the role of the instructional environment that needs to be examined (Brody, 1984); it should not be assumed that students will attend to illustrations simply because they are included in texts (Dean & Kulhavy, 1981). As stated by Summers (1969, p. 146-147), "Students should be taught to learn from pictures; instruction and direction in how to use pictures can result in closer scrutiny of them."
The use of visual imagery as a means of facilitating recall has been demonstrated in a number of verbal/pictorial paired-associate studies (Davidson, 1964; Levin & Kaplan, 1972; Lynch & Rohwer, 1971; Paivio, 1969; Reese, 1965). Findings from these studies may have important implications for determining what might be the most effective methods of picture-related instruction.

First, it has been documented that memory performance is better with pictures than with words (Nelson, Reed, & Walling, 1976; Paivio, 1975). As suggested by Paivio and Csapo (1973) pictorial stimuli may provide a qualitatively superior sensory code. This finding highlights the need to recognize the positive instructional potential textbook pictures have to offer and to develop techniques to maximize this potential.

Second, it has been hypothesized in Paivio's "dual-trace" theory that the reason pictures are remembered better than words is because a picture can trigger a subjects' imaginal and verbal systems and thus has the advantage of having two, redundant copies of the memory trace laid down. Paivio (1969) suggests that it is more than simple repetition at work. It is, for example, not merely that information presented in a picture may be repeated in the text and thus facilitate recall. It is more likely that recall is facilitated by manipulations which induce deeper or more elaborative processing (Craik & Lockhart, 1972), processing which involves both the verbal and imaginal memory systems proposed by Paivio. Based on this research, the implication for instruction suggested is that children should be taught the use of both verbal and visual elaborative activities in an integrated manner (Rohwer, 1970) since
facilitation of retention results from "integrated imagery," aroused by materials in context.

A third finding is that recall is facilitated if imagery encoding occurs first before verbal processing (Koslyn, Holyoak, & Huffman, 1976). Supporting this concept, Rohwer (1970) states that given a choice, the stimulus or cue for some desired response should be concrete rather than abstract, pictorial rather than verbal. This finding is also in keeping with Paivio's "conceptual-peg" hypothesis: the image serves as a "peg" for storage and retrieval of the response item (Reese, 1970). Thus, it would appear that instruction should first focus on pictorial material before relating the information to the accompanying written material.

Another factor from the related research has been the notion that a child's capacity to make effective use of visual representation and storage is developmental in nature. Based on a series of studies, Rohwer (1970) concludes that the capacity to make use of visual representation develops later than is the case for verbal modes of representing and storing information. Reese (1970) notes that young children store imagery materials as separate elements because of a failure to observe the interaction depicted. Related to this issue, the influence of imagery instruction is predicted to facilitate the performance of children as they increase in age (Palermo, 1970; Reese, 1970; Rohwer, 1970). These findings, therefore, suggest that children in the intermediate grades would profit more from pictorial instruction than primary grade children.

There is also evidence in the literature that hemispheric differences between the sexes exist which have a bearing on the extent to which males and females develop imagery skills (Bradshaw & Gates, 1978;
Sex differences in spatial skills are widely supported by a number of studies which have been reviewed (Maccoby & Jacklin, 1974; McGee, 1979). Although research has not clearly demonstrated than one sex is more "visual" than another, Ernest (1968) found that differences between high and low imagers is greater for females than males. From adolescence onwards, however, spatial visualization has been reported to be an area of male strength (Maccoby & Jacklin, 1974).

Some authors have suggested that pictures could serve functions usually associated with non-pictorial forms of instruction (Brody & Legenza, 1980; Duchastel, 1981; Hartley & Davies, 1976). It has been suggested that pictures could serve as visual advance organizers (Hartley & Davies, 1976), in a similar manner to their verbal equivalents. It has been shown that relevant contextual knowledge is a prerequisite for comprehending prose passages (Bransford & Johnson, 1972); pictures could serve as concrete visual sources for building this prerequisite schema prior to the learning of abstract verbal material. Pictures could also serve a review function, similar to questions placed at the end of a chapter (Brody & Legenza, 1980); pictures could serve as cues for the retrieval of verbal ideas associated with them (Duchastel, 1981).

In their study using a map as an advance organizer to expository material, Dean and Kulhavy (1981) found that the students who outperformed all other groups on multiple-choice, free-recall and short answer measures alike, were those who had been forced to process the map prior to reading. The key factor to note here is that the best performers were forced to process the visual through the use of related verbal instruction. This
study, therefore, supports Pavio's "dual-trace" theory and highlights the need for the integration of verbal and visual components in preliminary instruction.

Current research about human memory indicates that it is a multiple storage system with three main components: 1) a sensory register, 2) a short-term memory, and 3) a long-term memory (Andre, 1979; Gagne and White, 1978); difficulties with long-term memory storage of picture information will occur if images are not translated into semantic forms (Berry, 1980). For children to verbally recall information from an illustration, they must have stored simultaneously the image and the verbal code (language) for that image. Effective storage occurs when the picture children are to remember is immediately associated with words, first oral and then written (Hittleman, 1985). Accompanying verbal instruction should not only be directed at helping students link background knowledge with the picture content, but should also help students to integrate graphic information with that found in the text (Reinking, 1986).

In a series of experiments (Erdelyi, Finkelstein, Herrell, Miller, & Thomas, 1976; Erdelyi & Kleinbard, 1978; Shapiro & Erdelyi, 1974) an unusual memory phenomenon has been obtained. Instead of the classic Ebbinghausian function in which memory decreases with time, researchers have been able to produce the opposite of forgetting (hypermnesia instead of amnesia) such that recall progressively increases with time over successive recall attempts. When the stimuli to be remembered are pictures (but not, apparently, when they are words) the effect is both highly reliable and powerful. This research highlights the importance of
delayed measures of recall in a study concerned with pictures.

Further studies (Dwyer, 1973; Rusted & Coltheart, 1979) have shown that performance is not affected so much by factors such as the type of illustration, or placement position in the text, but more by the method of instruction which is utilized.

Summary:

In summary, the body of literature has recognized the need to examine the effect of using pictures (which are not merely present but are processed both visually and verbally) as aids to the comprehension and retention of the accompanying textual information. There have been few attempts on the part of those interested in prose learning to explore the implications of employing both types of stimuli (visual and verbal) (Beck, 1984; Snowman & Cunningham, 1975).

C. Purpose of the Study

It is apparent that intermediate grade students receive little instruction in how to comprehend their Social Studies textbooks through the integrated use of both visual and verbal stimuli (Beck, 1984; Hayes & Readence, 1983; Kunen & Duncan, 1983; Reynolds, 1968; Snowman & Cunningham, 1975; Summers, 1965). Contemporary research suggests that the mere presence of pictures in a textbook may, in some cases, improve comprehension and recall of the accompanying textual material, but, in order to maximize the instructional potential of illustrations, a more
structured approach may be what is required. A visually structured lesson would: 1) focus first on concrete, pictorial material rather than the more abstract, verbal material, 2) utilize pictures to activate existing schema, 3) employ pictures to provide a structure, or conceptual "peg" for organizing and relating the more abstract, verbal material, and 4) use pictures as review frameworks for recalling and rehearsing the content of the accompanying text.

It was the purpose of this study to determine whether students who are required to process the pictures in their Social Studies textbooks, in a structured manner (integrating picture with text content), would achieve better comprehension and recall of the accompanying connected prose than those who pay only incidental attention to the pictures (focusing, instead, solely on text content). Also examined is whether such instruction is best directed at a particular reading ability group or gender.

Specifically, the questions were:

1. Would grade five and grade seven students, who are exposed to a visually structured lesson, demonstrate superior comprehension of a chapter from their prescribed Social Studies textbook, over students receiving text processing instruction only, on an immediate and a delayed multiple choice test?

2. Would grade five and grade seven students, who are exposed to a visually structured lesson demonstrate superior comprehension of the connected prose in a chapter of their prescribed Social Studies textbooks, over students receiving text processing instruction only, on an immediate and delayed short answer recall
3. Would there be an interaction between treatment condition and reading ability levels as observed on measures of both immediate and delayed comprehension? That is, would the performance of students of low, middle, and high reading ability levels be affected depending on the type of instruction received?

4. Would the gender of grade five and grade seven students affect performance on measures of both immediate and delayed comprehension of the connected prose, with or without the visually structured lesson?

To answer these questions, six null hypotheses were formulated for each grade:

Hypothesis 1: There will be no significant difference between the treatment groups on their adjusted mean posttest performance on an immediate multiple choice test measuring immediate levels of comprehension.

Hypothesis 2: There will be no significant difference between the treatment groups on their adjusted mean posttest performance on a short answer recall test measuring immediate levels of comprehension.

Hypothesis 3: There will be no significant difference between the
treatment groups on their adjusted mean posttest performance on a delayed multiple choice test measuring delayed levels of comprehension.

Hypothesis 4: There will be no significant difference between the treatment groups on their adjusted mean posttest performance on a delayed short answer recall test measuring delayed levels of comprehension.

Hypotheses 5 and 6, as they deal with a number of interaction effects, are differentiated into the following sub-hypotheses:

Hypothesis 5 (i): There will be no significant difference between treatment conditions (experimental, control) in the performance of the different reading ability groups (low, middle, high) as measured by adjusted mean posttest performance on the immediate multiple choice test.

Hypothesis 5 (ii): There will be no significant difference between treatment conditions (experimental, control) in the performance of the different reading ability groups (low, middle, high) as measured by adjusted mean posttest performance on the immediate short answer test.
Hypothesis 5 (iii): There will be no significant difference between treatment conditions (experimental, control) in the performance of the different reading ability groups (low, middle, high) as measured by adjusted mean posttest performance on the delayed multiple choice test.

Hypothesis 5 (iv): There will be no significant difference between treatment conditions (experimental, control) in the performance of the different reading ability groups (low, middle, high) as measured by adjusted mean posttest performance on the delayed short answer test.

Hypothesis 6 (i): There will be no significant difference between treatment conditions (experimental, control) in the adjusted mean posttest performance of males and females on the immediate multiple choice test.

Hypothesis 6 (ii): There will be no significant difference between treatment conditions (experimental, control) in the adjusted mean posttest performance of males and females on the immediate short answer test.

Hypothesis 6 (iii): There will be no significant difference between
Hypothesis 6 (iv): There will be no significant difference between treatment conditions (experimental, control) in the adjusted mean posttest performance of males and females on the delayed short answer test.

D. Definitions

comprehension: for the purposes of this study, comprehension was measured by the amount of recall demonstrated on both a multiple choice and short answer recall test.

experimental treatment: in the experimental condition students were exposed to a visually structured lesson concerned with one chapter segment from their prescribed Social Studies text.

control treatment: in the control condition students were exposed to a guided silent reading lesson, concerned with the same Social Studies chapter segment in identical format to the experimental treatment.

visually structured lesson (experimental): in this lesson students were required to:

1. study and answer questions about a picture,
2. relate picture content to existing knowledge,
3. read silently the related connected prose,
4. restudy the picture while answering questions which sought to integrate text content with picture content,
5. study the picture while answering questions which sought to stimulate recall of the connected prose
6. follow this procedure for the next picture and text segment

Students answered questions in both oral and written form.

**Guided silent reading lesson (control):** in this lesson students were required to:

1. discuss a purpose for reading segment of the chapter
2. read silently for specific information (prequestion)
3. give the answer to the pre-question (postquestion)
4. answer further questions checking comprehension and recall
5. follow this same procedure for the next text segments, which were identical to those differentiated in the visually structured (experimental) lesson

Students responded in both oral and written form.

**E. Assumptions**

It was assumed that:

1. The tasks which were required of students in this study had some relation to the types of tasks required of students in a regular school setting.
2. The initial and final test instruments used in this study provided an adequate method for assessing immediate and delayed recall of information.

3. A weighted recall test scoring system is an appropriate and reliable method for assessing immediate and delayed recall of information.

F. Significance of the Study

This investigation is seen as having practical significance for classroom instruction. The study adds to the information base of content area research by providing further insight into the extent that processing pictures may have on both the immediate and delayed recall of grade 5 and grade 7 students. More specifically, this study may contribute to knowledge about types of content area instruction, offering an instructional procedure which includes the combining of visual and verbal elements in a structured lesson.

G. Organization of the Thesis

The thesis is organized in five chapters. Chapter One presents the problem and the 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 analyses. Chapter Five includes a summary of the study and states the limitations, conclusions, and implications for future research.
CHAPTER II. Review of the Literature

In examining the question of whether or not pictures in Social Studies textbooks could serve a facilitative function on comprehension of connected prose, it is important to consider the pertinent research that has already been conducted.

This review will focus on four main areas of the literature. The first section deals with studies which have examined the influence of illustrated versus non-illustrated texts. The second section presents literature which is related to eye movements and picture viewing behaviour. The third section is concerned with several aspects of visual imagery research, and the final section discusses studies related to learning theory. In the majority of the studies reviewed here, the subjects that were involved were intermediate grade students or older. In addition, unless otherwise stipulated, an attempt has been made to confine the studies reviewed, for the most part, to those dealing with content rather than narrative materials. Those studies that are concerned with narrative materials, were selected because their focus was not on learning how to read, but on reading comprehension.

A. Picture Effect in Illustrated versus Non-Illustrated Text

Studies comparing illustrated versus non-illustrated text can be
divided into two categories, learning to read words, and learning to read both narrative and expository material for comprehension and recall. For the purposes of this study, the review of the literature will be confined to the latter category, learning to read prose materials for comprehension and recall.

In their review of 155 experimental comparisons of learning from illustrated text versus text alone, Levie and Lentz (1972) found that the illustrated text version was consistently better than the text alone version. Differences found were more pronounced in some studies than in others.

As one example, in two studies undertaken by Vernon (1953) the effect of pictures on the learning of children aged 11-12 was investigated. Researcher-designed instructive material with or without pictures was read to or read by children from grammar and secondary modern schools. Although spontaneous recalls and questions failed to show that any of the pictures assisted either understanding or remembering of the printed text, there was a slight tendency for certain isolated items to be recalled better when they were specifically presented in pictures.

Another study, although pictures specifically were not used, can be classified under the topic of illustrated versus non-illustrated text studies. This study (Weisberg, 1970) investigated whether advance organizers in the form of visual aids might serve the same function as Ausubel's verbal advance organizers. The basic design of the study consisted of a 4 x 3 x 2 ANOVA factorial design. Ninety-six grade eight
students were involved in the study. One group was exposed to a physiographic diagram or map of the North Atlantic Ocean Floor. A second group was exposed to a topographic profile or graph of the North Atlantic Ocean Floor. A third group read a 500 word passage which covered the same information as the advance organizers of the other two groups. A fourth group functioned as a control group, and was not exposed to any form of advance organizer. After examining the organizers, all students read a text passage dealing with continental drift which used ocean floor features to illustrate the theory. ANOVA treatment of the post-test scores indicated that visual advance organizers, both the map and the graph of groups one and two, functioned at a significant level whereas the expository organizer did not function for any of the groups (low, medium, and high categories of prior knowledge) in the study. Post-hoc comparisons, however, revealed that the greatest group mean difference appeared between those students who were exposed to the map organizer and the control group. The graph, used for the second group, functioned almost as well as the map as an advance organizer.

Experimenter-provided pictures were found to produce significant recall effects over subject-generated elaboration or experimenter-provided verbal elaboration in a study conducted by DeRose (1976). The sample consisted of 192 fifth-grade students. Based on scores obtained from standardized reading tests, subjects were divided into those above and those below grade level. Each child read a social studies textbook passage under one experimental condition and answered 14 short-answer questions about it. Results revealed that for questions based on
elaborated text, the only significant effect was for experimenter-provided pictures; for questions based on unelaborated parts of the text, there were no significant effects. It was also found that the low and high ability groups benefited from illustrations about the same amount compared to the control, although an examination of the means shows a slight tendency that poor readers may benefit more from the presence of pictures than good readers.

In another study (Peeck, 1974) cited by Levie and Lentz, with narrative material, a positive effect for illustrated versus non-illustrated text was found, but also with certain qualifications. Subjects used were seventy-one fourth graders. They were given either an illustrated or non-illustrated version of a "Rupert Bear" story to read silently. A retention test was given immediately after the story, one day later, or after one week. Although a more pronounced effect at delayed testing was evident, results indicated that at all three of these testing times the experimental condition (text with illustrations) produced higher scores than the control (text without illustrations) but only for questions concerning exclusively pictorial information and for questions concerning correctly illustrated text contents. No differences were found for questions covering unillustrated text contents.

In contrast, Rusted and Coltheart (1979) were able to demonstrate in two separate studies that the presence of pictures increased the recall of both pictorial and nonpictorial features from descriptive text passages.

In the first study seventy-two nine year old children were divided
into good and poor readers on the basis of the Schonell Graded Reading Vocabulary Test. The experiment involved a $2(\text{sex}) \times 2(\text{reading age}) \times 2(\text{picture or no picture at presentation})$ split-plot analysis of variance using reading age and sex as between-subjects variables, the latter with unequal group size, and presentation condition as a within-subjects variable. Six factual passages were randomly divided into two sets of three.

Each subject received both sets of passages, one with pictures and one without. After reading each passage orally twice, subjects were asked to recall orally all they could about the topic in question. A second, delayed recall was again completed orally between 5 and 7 minutes later. Finally a picture-word association task, where labels and pictures had to be matched, was introduced to the subjects.

The results revealed that on immediate recall, the children recalled significantly more features from passages presented with pictures than from those presented without [$F(1,68)=4.69$, $p < .031$]. There was no main effect of reading ability, nor did it interact with presence/absence of pictures. This pattern of results was repeated in delayed recall, where the picture/no-picture effect was more pronounced [$F(1,68)=22.58$, $p < .011$]. The sex of the subject did not significantly affect recall under any condition. The proportions of correctly recalled features were also analyzed in terms of their qualities, either pictorial or nonpictorial. There were significantly more of both types of features recalled in the picture condition than in the no-picture condition. Analysis of performance on the picture-word association task demonstrated
significant effects of presentation condition and of sex; performance was better on pictures seen prior to the task (with the passages), and females were superior to males at this task.

The authors suggest that the better performance in the picture condition on delayed recall than immediate recall was as a result of the pictures helping subjects to retain information more accurately over longer periods of time. They do not offer any possible explanations as to why, in the picture condition, the females outperformed males on the picture-word association task.

The failure to find an effect for reading ability in the first study, led the authors to investigate this topic further in a second study. One hundred nine year old children from Junior Schools in Reading, England served as subjects. This time, however, different than the first study, reading ability was measured with a non-oral, comprehension test. The procedure was identical to that followed in Experiment 1, with the omission of the picture-word association task, and with the inclusion of three experimental groups (line drawings or no pictures, colour drawings or no pictures, colour and background or no pictures) instead of two. Analyses of covariance were completed on the resulting data. Results were similar to the first experiment. For all three experimental groups, pictures significantly enhanced recall, particularly in delayed recall. Recall was not affected by the type of picture involved or by chronological age, reading age, or sex of the subject, although there was a slight trend towards pictures benefiting the performance of the poor readers more than the good readers. Contrary
to the first study, where more features of both pictorial and nonpictorial information were recalled in the picture condition, in this second study, more nonpictorial features were recalled under all conditions.

The authors conclude that pictures may be used effectively to enhance comprehension and retention of printed materials, and that this enhancement is not restricted to the pictorial aspects of the passage.

In another study conducted by Haring and Fry (1979) pictures were found to facilitate both the immediate and delayed recall (5 days later) of narrative material. Subjects were fourth and sixth grade students, exposed to a story with or without pictures. Results showed that picture facilitation of recall occurred only in the recall of main ideas but not of nonessential details. Not unlike other studies of this nature, the picture effect was more pronounced at delayed recall than in immediate recall. The researchers suggest that further exploration of delayed picture benefits be investigated, to help determine the maximum length of time picture facilitation of recall of prose material will endure.

In Levie and Lentz's review (1972) of illustrated versus nonillustrated text studies, not only was it found that the illustrated text version was consistently better than the text-alone version, but two trends were identifiable. First, the superiority of the illustrated text version was more pronounced in delayed recall than in immediate recall, and second, it was more pronounced for poor readers than for good readers.

As previously discussed, the more pronounced effect of the
presence of pictures on delayed recall was seen in the Peeck (1974), Rusted and Coltheart (1979), and Haring and Fry (1979) studies. In a list of 24 comparisons of immediate and delayed tests, Levie and Lentz (1972) illustrate that of these 24 studies, 19 show that pictures helped more in delayed than in immediate recall. Overall, the average group facilitation from pictures was 45% in delayed testing, compared with 9% in immediate testing. In most cases, however, the comparison was between test and retest, and often the test delay was rather brief (Haring & Fry, 1979, Rusted & Coltheart, 1979).

The trend towards pictures facilitating recall more for poor readers than for good readers was seen in the studies of DeRose (1976) and Rusted and Coltheart (1979). In Rusted and Coltheart's study (1979), for example, there was evidence that for good readers, the pictures facilitated retention of the passage as a whole, since good readers showed equally enhanced retention for picture and nonpicture information. In contrast, the enhanced retention of poor readers seemed to be caused mainly by an increase in recall of picture information. Indeed, the researchers in another article (Rusted & Coltheart, 1979) observed that poor readers during the experiment frequently moved their eyes from the passage to the picture. In contrast, the good readers paid little or no attention to the pictures during their reading. This suggests, based on the data, that increased recall in the picture condition reflected incidental use of pictures by the good readers, and a more intentional usage by the poor readers. Only one researcher listed by Levie and Lentz, however, produced a significant interaction between reading
ability and the presence/absence of pictures; Wardle (1977) found that illustrations helped below-median readers but had no effect on above-median readers.

Additional studies, not discussed in Levie and Lentz's review have also demonstrated a positive effect for illustrated versus nonillustrated text.

Borges and Robins (1980) conducted a study which examined the effects of different types of introductory materials on comprehension and recall of a narrative passage. Six groups of 20 subjects (undergraduate students) were each presented different preliminary material, appropriate context picture, partial context picture, no picture, character-motivation story, or no story, in a 3 x 2 design. Both the pictures and the story increased the ratings of comprehension, but only the pictures increased performance at recall. The authors suggest that whether a particular type of introductory material will produce a schema that enhances recall may be a function of the nature of the to-be-remembered passage.

A study conducted by Levin, Shriberg, and Berry (1983), with content materials, found that illustrations were not helpful compared to a nonillustrated condition unless the pictures were presented with key words. This result was found across four experiments with eighth grade students. Keyword illustrations proved to be highly effective facilitators of students' memory for and organization of the critical passage information.
In another study, Covey and Carroll (1985) investigated the effect of pictures on reading comprehension under different levels of text organization. One hundred and thirty-two sixth graders read three science passages, presented with or without pictures. The picture condition was crossed with three levels of text organization. Multiple-choice test scores were analyzed using reading comprehension scores from the California Achievement Test as a covariate. Analysis revealed that pictures facilitate comprehension for some science texts, but there was no evidence to support a hypothesis that pictures would be more helpful for less well organized texts than for better organized texts.

Joseph and Duyer (1984) found support for the idea that certain types of visuals may be more effective than others. In a study involving 414 tenth grade students, results provide evidence that students with a low level of prior knowledge may find several types of visuals (simple line drawing, realistic photograph, hybrid presentation/realistic with line drawing superimposed, two illustrations/one realistic and one line drawing) equally effective. Students with moderate and high levels of prior knowledge of the subject, however, benefited more from the realistic illustrations. All types of visuals produced better recall than no visuals on both immediate and delayed measures.

Two studies conducted by Hayes and Readence (1982, 1983) also found a positive effect for illustrations, but groups with illustrations did not benefit more from one type of instruction than another.

In the first study, the authors sought to determine not only
whether illustrations would help children understand prose material but whether giving them oral instructions to look at the illustrations would make a difference. Subjects used were 82 eighth graders in a rural school in Georgia. All subjects were exposed to four different treatments. In the first treatment condition the subjects read a text without illustrations and performed study exercises without any instructions other than to refer to the text to complete problems. In the second treatment condition, the texts were augmented by line drawings depicting text content; no instructions were given to look at these drawings. In the third treatment condition, the texts also contained the line drawings but this time the students were advised to pay careful attention to the pictures. In the final treatment condition the text had no illustrations, but subjects were instructed to try to imagine their own pictures to accompany the text content. Analyses of results showed that subjects performed better on texts augmented with illustrations than on texts without illustrations. No effect, however, was noted for instruction condition, either to attend to illustrations when they were present or to imagine the content when they were not present.

The second study (Hayes & Readence, 1983) was similar to the first, in that the four treatment conditions were the same. This time, however, an attempt was made to determine whether varying degrees of a text's dependence on illustrations would affect additional reading on a topic. Seventh graders used in this study read four passages of differing degrees of illustration dependency under the four different treatment conditions. The interactions between treatment conditions and
level of illustration dependence suggest that subjects given texts for which illustration dependence was moderate to high benefited from the presence of illustrations. For those subjects, significantly more information was recalled if the related text was illustrated; also, those subjects included a significantly greater proportion of reader-based information in their recall of transfer passages. Although instructions to attend to text illustrations did appear to enhance performance on transfer tasks, such instructions did not significantly improve performance beyond what was achieved by the mere provision of illustrations in the illustration-dependent texts. The authors caution, however, that it should not be assumed that readers will automatically give attention to illustrations in content area texts, and as a matter of sound educational practice, teachers should continue to call readers' attention to text illustrations.

Additional support for the superior facilitation of delayed recall with illustrated text is provided in a study by Duchastel (1980). It was found with 15 year old students that those exposed to expository passages with illustrations outperformed those without, on a total cued-recall test, but only in the case of delayed testing (two weeks after) and not when testing was immediate. Those who completed the delayed test did not receive immediate testing. Nevertheless, the author states that this study does not offer solid confirmation of a retentional role for illustrations in text since there was no significant interaction obtained on a topical-recall test as was expected.

A study undertaken by Donald (1983) lends additional support to
the idea that poor readers may benefit more from illustrations than good readers. From 1,868 children across grades one to five, 120 good and poor readers at reading ages of 7 and 9 were selected. Subjects read narrative passages with or without pictures. Results demonstrated that illustrations were adaptively used for textual message identification, information processing strategy, and comprehension by good readers at a reading age of 7. Poor readers particularly at a reading age of 9 showed significant illustration effects but strategy results suggested a non-adaptive function. Good readers at a reading age of 9 were least affected, appearing independent of illustrative information.

How is it that pictures might function to enhance comprehension and recall? One suggestion (Levie & Lentz, 1982) is that pictures provide information that is redundant to text information, affording a second learning opportunity. The repetition may reduce forgetting. There is evidence, however, that more than simple repetition is at work.

Levin, Bender, and Lesgold (1976) compared children's recall of oral narrative prose presented once, the same prose presented twice, and prose presented once with pictures. While the listening repetition did help, the pictures helped to an even greater extent. Ruch and Levin (1977) also found that repetition of oral noninstructional prose compared with repetition of prose and pictures produced qualitatively different recall patterns, further demonstrating that the facilitation of memory due to pictures involves more than mere repetition.

The study of eye movements and visual memory processes offers a relevant contribution to the understanding of how pictures might function to enhance learning.
B. Eye Movements and Picture Viewing Behaviour

It has been noted (Nesbit, 1981) that the reading process is distinctly different from the picture-viewing process. Reading is a somewhat regimented process of fixating words left-to-right, line-by-line, whereas picture viewing is an unstructured and exploratory process. Furthermore, the pictures themselves influence the looking behavior considerably more than words influence scanning behavior.

A number of researchers have investigated the nature of eye movements during picture viewing. One characteristic of the viewer which has been isolated is the tendency to look first at the center of interest. Kaufman (1969) studied the spontaneous fixation tendencies of the eyes when confronted with very simple forms. Among the findings was that for figures subtending angles less than 5 degrees the eye is directed toward the center of the figure, and not toward its edge. A second characteristic of picture viewing is that the subject's eyes will next move widely over the picture. Such eye movements are necessary because the area of clear vision available to the stationary eye is severely limited (Neisser, 1968). Only a small region around the fixation point will be clear. Only in the fovea, the small central part of the retina, are the receptor cells packed close enough together (and appropriately organized) to make a high degree of visual acuity possible. Although people are unaware of their own eye movements and see a picture
or a scene as a whole, far from simply being a copy of the retinal display, the picture is somehow constructed on the basis of information taken in during many different fixations. Another characteristic of eye movement patterns during picture viewing has been observed by Mackworth and Morandi (1967). Their visual fixation data revealed that subjects spent more time fixating on the unpredictable or unusual features of a picture; more specifically, the peripheral retina quickly screened off the redundant and more predictable features, leaving the fovea free to process the unpredictable and unusual stimuli.

Examining the nature of eye movements has led researchers to ask do the number of eye fixations directed towards a picture influence how well a subject will perform on later measures of recall? Is the number of eye fixations, in fact, a reliable external indicator of internal cognitive processes? This is a topic which has been investigated by a number of researchers.

Loftus (1971) found that the number of eye fixations made by a subject while initially viewing a picture was the best indicator of subsequent picture recognition. It was found that higher-valued pictures both received more fixations and were remembered better than low-valued pictures, but when number of fixations was held constant, memory performance was independent of value. It was also found that when pictures are viewed for a fixed amount of time, memory performance is a positive function of number of fixations on the picture, and with number of fixations held constant, performance is independent of exposure time.

Flagg & Weaver (1981) also found significant correlations between
fixations and recall of factual material with third and fifth grade children. Although the recall of high importance material (main ideas) was not significantly correlated with the percent of time or percent of fixations on the pictures, there were significant correlations between picture usage and recall of low importance text units (details). For both free and probed situations, recall of low importance text was significantly correlated with percent of time spent looking at the pictures and with percent of fixations. Analysis of the eye movement data of the condition with picture identified a wide range of picture usage patterns which crossed boundaries of grade, reading skill, and text category. Eight percent of 48 children ignored the picture completely, 17% looked at the picture both before and after reading but not while reading the passage, 23% either examined the picture completely before or after they read the text through without interruption, and finally, 52% of the children interrupted their reading at least once to scan the picture. Thus, no consistent, homogeneous viewing pattern could be identified.

Nesbit (1981) also found a positive correlation between the number of eye fixations, measured unobtrusively, and subsequent recall in a study conducted with college students as subjects. An additional finding was that there was no relationship between type of visuals used and eye movements.

This is in contrast to what Tversky (1974) found in her study. With the use of simple line drawings, those subjects who fixated on the materials fewer times had the highest recall on later memory tasks. It has been suggested (Nesbit, 1981) that this result could be related to
Mackworth and Morandi's (1967) findings that complex pictures receive more attention than simple representations.

Related to how pictures are viewed is how pictures are remembered or stored. It has been said that visual perception is as much concerned with remembering what we have seen as it is with the act of seeing itself (Haber, 1970). Investigations concerned with visual memory have suggested that the capacity of memory for pictures may be unlimited. In one such experiment subjects were able to recognize as many as 600 pictures they had seen for only a short time. In another experiment (Standing, 1973) were able to demonstrate that at least four times this amount of material can be recognized. It has been noted, however, that although a person may remember almost any picture he has ever seen, he frequently is unable to recall details from a specific picture if asked to do so. Haber suggests that the reason for this inability is that the picture was not originally stored in the form of words. Based on his experiments, one implication of his findings advanced is that if techniques could be found to facilitate an attaching of words to visual images, recall might dramatically improve.

When pictorial memory is compared to the way in which words, numbers, and other symbols are remembered, again, like the processes of visual and linguistic perception, it is evident that the two systems are very different. Each kind of memory handles material that is perceived when light stimulates the retina, generating impulses that are then coded, organized, and sent to the brain. In the case of pictures, the image is received and stored permanently in pictorial form. With words
or other symbols, however, the first step of memory is to take the stimulus out of its visual, pictorial form, code the items, and extract their meaning (Haber, 1970).

Pribram (1969) advances a more elaborate theory of visual memory based on a large number of experiments with monkeys. According to this theory what we see is not a pure and simple coding of the light patterns that are focused on the retina. Somewhere between the retina and the visual cortex the inflowing signals are modified to provide information that is already linked to a learned response. What reaches the visual cortex is evoked by the external world but, unlike Haber, is hardly a direct or simple replica of it. As well, the information inherent in the input becomes distributed over wide regions of the visual cortex. Pribram suggests that the brain may exploit the most sophisticated principle of information storage yet known: the principle of the hologram. In a hologram the information in a scene or picture is recorded on a photographic plate in the form of a complex interference, or diffraction, pattern that appears meaningless. When the pattern is illuminated by coherent light, however, the original image is reconstructed. Thus, remembering or recollecting literally implies a reconstructive process.

Whether students actually make use of pictures in their textbooks is an issue which arises from this research. Findings which demonstrate a positive correlation between memory performance and number of fixations point out the need for teachers to address themselves to students' picture viewing behaviour. Summers (1971) suggests that the kind of directions given at the time subjects look at pictures clearly influences the
perceptual viewing patterns and length of fixations. Other authors have pointed out that many students may not view pictures as serious sources of information, and that it should not be assumed that students will attend to illustrations simply because they are in their textbooks (Dean & Kulhavy, 1981; Friedman, 1969; Levie & Lentz, 1982; Nichols, 1983).

C. Visual Imagery Research

Visual images are assumed to be functionally related to visual perception and are specialized for spatial representation; visual imagery is primarily a parallel processing system (Paivio, 1969). Many of the studies concerned with imagery demonstrate that the use of imagery instruction, and pictures, in paired associate tasks, enhances recall. Explanations for these differences have been proposed by Paivio (1969) in his dual-coding hypothesis, and by Kosslyn, Holyoak, and Huffman (1976) in their semantic elaboration hypothesis. As a result of some of the studies on imagery, developmental and gender differences in subjects' ability to use imagery have also been observed. Finally, suggestions which seek to relate this body of research to classroom instruction have been given.

Snodgrass and McClure (1973) studied the storage and retrieval properties of pictures and words, with undergraduate students. The resulting data revealed that old pictures are remembered better than old words, the form of the test item, whether picture or word, has no effect
on recognition memory, and imagery instructions improve recognition of words over verbal instuctions, but verbal instructions do not improve recognition of pictures over imagery instructions.

In another study which explored the effects of imagery and text organization on what is learned, Steingart and Glock (1979) found that regardless of text organization, imagery instructed subjects recalled significantly more correct text relations than subjects instructed to repeat passage information to themselves.

Further support for the positive effects of imagery is provided by Levin (1973) in a study involving fourth graders. It was found that imagery instructions were facilitative for story comprehension compared to receiving the story entirely in pictures with no verbal labels, or the story by itself with no pictures or instructions to image.

However, for older students (high school seniors), Anderson and Kulhavy (1972) found that imagery instruction facilitated prose learning to a lesser extent. Although students who reported having generated images while reading the passage recalled more about the passage than students who did not, the instructional main effect was not significant.

Many other studies have found that imagery can function as an extremely potent mnemonic with a wide variety of materials, ranging from paired-associates to sentences and paragraphs (Anderson, 1971; Bower, 1972; Bugelski, 1968; Johnson, 1970; Morris & Reid, 1972; Paivio, 1970).

From paired-associate studies there is much evidence that first, pictures are maintained more durably in memory than words, and secondly, that information coded both iconically and verbally tends to suffer less
memory loss than information coded solely in either system.

In a paired-associate task, a collection of discrete item pairs are passively presented to the subject. The pairs are then removed and upon presentation of the first member of the pair (the stimulus term), the learner must recall or recognize the second member of the pair (the response term). The success of the learner is dependent upon the permanency of association between the pairs (Levin, 1972).

With young children, much of the paired-associate research has centred around presenting the paired items as words, as pictures of the items, or as picture-word pairs, systematically varying the concreteness both between and within the pairs (Rohwer, 1970). Research has rather consistently shown that pictures are superior as stimulus items over words for both children and adults (Dilley & Paivio, 1968; Levie, 1973; Levin, 1974). As an example, Dilley and Paivio (1968) conducted a paired-associate task with five and six year old children to investigate the effects of pictures and words as both stimulus and response items. They found that pictures significantly facilitated learning as stimulus items, but that words had a negative effect as response items.

In several studies it has been shown that subjects who are instructed to either evoke images or use a mnemonic when associating paired objects regularly outperform those left to their own strategies (Anderson & Kulhavy, 1972; Boutwell, 1972; Bower, 1970; Rasco, Tennyson, & Boutwell, 1973). Such experiments seem to suggest that information coded both iconically and verbally tends to suffer less memory loss than information coded solely in either system. Rohwer and others (1968) have
stated, for example, that the ability to profit from stored images is contingent upon a subject's ability to store an appropriate verbal representation of the object along with its image. Odom and Nesbit (1974) found that for subjects presented both verbal and visual elaboration, performance was better than when only one mode of elaboration was presented. Reese (1970) concurs with this concept when he states that facilitation of retention results not so much from imagery, and hence meaning, in general, but from integrated imagery, and hence contextual meaning. Integrated imagery is aroused by materials in context, whether in a sentence or smaller word-group. It has been suggested (Bransford & McCarrell, 1972) that meaningful relations among items may be a more important variable for memory than concreteness and abstractness ratings for isolated words.

Interestingly, for older subjects, high school students and undergraduate students, Snodgrass, Volvovitz, and Walfish (1972) found no improvement in recognition memory performance when both a picture and its corresponding word were presented as stimuli over the presentation of a picture alone. They suggest that one possible explanation of this result is that their subjects, by this age, automatically engaged in dual coding of pictures.

Several theoretical approaches have attempted to account for the facilitative effect of pictures, or imagery arousal. Craik and Lockhart (1972) suggest that repetition will aid recall only if the second presentation induces the learner to process the material at a different semantic or sensory level. They suggest that long-term recall is
facilitated by manipulations which induce deeper or more elaborative processing. Similarly, Kosslyn, Holyoak, and Huffman (1976) hypothesize that the processes leading to greater recall under imagery instructions are not specifically linked to either acoustic or visual processing, but, rather, image formation may improve recall by increasing semantic elaboration. Another approach, the dual-code model (Paivio, 1971), proposes two memory systems, an imaginal system and a verbal system, and predicts that a memory trace in both systems will be better than in only one. Paivio contended that visual imagery and verbal processes are alternative mental coding systems for the symbolic representation of meaning. Central to the notion of mental imagery as a comprehension strategy is the "conceptual peg" hypothesis (Paivio, 1983; Sadouski, 1983, 1985), which contends that key images serve as mental "pegs" to which associated information is hooked for storage and retrieval.

Evidence for the dual encoding hypothesis has been supported by findings that verbal and pictorial information may be independently acquired, coded, stored and retrieved, with minimal mutual interference and independent and idiosyncratic forgetting functions (Anderson, 1976; Paivio, 1971; Sherman, Kulhavy, & Burns, 1976). It has been stated that arguments in favour of an underlying propositional representation of pictures and images (which would make the imaginal system operate similarly, if not identically, to the verbal system) are not compelling, though empirically it may never prove possible to decide finally between an underlying representation in imaginal or propositional terms (Bradshaw & Nettleton, 1981).
In a free-recall experiment, Paivio and Csapo (1969) found that presenting a concept once as a word and once as a picture was superior to presenting the concept twice as word or twice as a picture. According to Paivio, a picture that is named has the advantage of having two, redundant copies of the memory trace laid down. The redundancy prolongs memory in comparison to abstract items, since the second, imaginal trace is likely to survive after the initial verbal trace has decayed. Not only are there two traces, but the one in the imaginal system seems more resistant to forgetting (Hilgard & Bower, 1975).

Some research suggests that it is the concrete aspect of the initial stimulus which is important. It has been found that recall is facilitated if imagery encoding occurs first before verbal processing (Kosslyn, Holyoak, & Huffman, 1976). Rohwer (1970) states that given a choice, the stimulus or cue for some desired response should be concrete rather than abstract, pictorial rather than verbal. The image serves, like Paivio's conceptual peg hypothesis, as a "peg" for storage and retrieval of the response item (Reese, 1970).

While Paivio's view of imagery was characterized by the its emphasis on the concrete aspects of a situation, Kaufman (1979) theorized that imagery is evoked when the task is characterized by novelty. It has been stated that the theory of mental imagery as static, immobile, and concrete has given way to a current conception of imagery as an active information-handling process (Gambrell and Bales, 1986). Not unlike Neisser's (1972) analogy of a hologram, imagery is represented by "layouts," not pictures. Kaufman (1979) theorized that imagery is useful
in general problem-solving, and particularly when the task is characterized by novelty, which induces a conflict and demands a change in thinking. Huttenlocher (1968) and Sadowski (1983) have concluded, too, that mental imagery is useful in both spatial and verbal problem-solving in reading situations.

Counter to what was earlier thought (Bruner, 1966), more recent work in the field of imagery suggests that the capacity to make effective use of visual representation and storage develops later than is the case for verbal modes of representing and storing information (Baine, 1982; Danner & Taylor, 1973; Haring, 1982; Reese, 1974; Rohwer, 1970). Rohwer, (1970) speculates why this occurs. He states that while language is a coherent, well-organized system, imagery is not. The capacity for using more well-organized systems is easier to acquire than the capacity for using more ad hoc means of controlling one's own behavior, and of storing and representing information. Thus the ability to use linguistic or verbal means for storing and preserving information emerges earlier developmentally than the ability to use visual or imagery processes for accomplishing the same ends. Although the evidence strongly suggests that there is a developmental shift toward the ability to "read" pictorial elaboration, the age at which this occurs is not clear and may be a function of the task characteristics. However, by the age of 7 or 8, most children are able to benefit from imagery instructions (Jensen & Rohwer, 1965; Levin, Davidson, Wolff, & Citron, 1973; Wolff & Levin, 1972). As well, Dirks and Neisser (1977) found that memory for information in pictures increased from age 6 to adulthood.
A number of imagery studies have explored the relationship between imagery ability and sex differences. Ernest (1968) found that these two factors significantly interacted in a paired-associate learning task such that differences between high and low imagers were greater for females than males. High imagery ability was positively related to learning in the female sample, whereas the converse was found with males. Ernest and Paivio (1971) conducted an experiment to further explore these differences. Their data suggests that in some tasks, females 'use' imaginal processes to facilitate recall whereas males do not. They also found that high-imagery males were superior to low-imagery males in recalling words; the results for females were in the reverse direction. In general, however, it has been concluded from their review of many studies, that no sex is more "visual" than the other (Maccoby & Jacklin, 1971). No sex differences are discernable from these studies in younger subjects; Brownfield (1965), however, found that with adults, men appear to have longer after-images.

Findings from imagery studies have led to a number of practical suggestions for improved classroom instruction. It has been suggested that performance is enhanced if imagery encoding occurs first before verbal processing; thus, it would appear that instruction should first focus on pictorial material before the accompanying written material is processed. Reynolds (1968) suggests, based on results from two experiments (1966, 1968), that the integration of verbal and pictorial stimuli into a single meaningful structure, rather than familiarization with these components separately, will aid learning. Based on his
experimental data, Beck (1984) also supports this concept, concluding that when pictorial and textual attributes are cued together, this combined cueing strategy may facilitate the learner's ability to remember these critical attributes. It was found that fourth grade students who received combinational treatment (pictorial and textual cues) with content material significantly outscored the students who received non-cued treatment. Kunen and Duncan (1983) suggest that verbal labeling is a simple pedagogical technique that teachers can use to significantly enhance children's awareness of the meaning in pictures. Steingart and Glock (1979) suggest that the application of an imagery strategy may markedly facilitate comprehension of text relationships in brief, concrete, highly structured texts.

An examination of the work done in the field of learning theory offers further suggestions for practical classroom application.

D. Learning Theory and Application to Pictorial Instruction

Research on human memory or learning offers knowledge about gender differences and effective methods of instruction. Some instances can be found where pictures were examined to determine whether they could serve functions usually associated with nonpictorial forms of instruction. In addition, the use of different combinations of presentation media has been studied, as well as different types and features of visuals.

The distinction between learning and memory is an arbitrary one.
What is remembered must have been learned. What has been learned can usually only be determined through asking subjects to recall or recognize the learned material. Maccoby and Jacklin (1974) do not regard memory as a "capacity" but as a set of processes, processes which individuals make use of to different degrees. If there are sex differences in interests, areas of knowledge, and abilities, these will be reflected in memory. Summarizing a number of studies, Maccoby and Jacklin (1974) conclude that girls show somewhat better memory for verbal content. More than half the studies cited found no sex differences, but when differences are found, girls have higher scores in every case. The superiority of girls in verbal memory is especially clear after about the age of 7. By contrast, sex differences, in studies examined by Maccoby and Jacklin, have seldom been found for the memory of objects or digits. The studies that used tasks calling for memory of both verbal and nonverbal materials present a mixed picture, but by and large do not show superiority of either sex.

Luria (1973) states that the process of memory is a complex one consisting of a series of successive stages, differing in their psychological structure in the volume of traces capable of fixation, and in the duration of their storage, and extending over a period of time. The process begins with the imprinting of sensory cues, a stage described as ultrashort memory; however, it has been pointed out that the traces of stimuli received in this period can be greatly extended in volume in cases of visual stimuli (Sperling, 1960; 1963). In the next stage of the memorizing process, stimuli perceived are converted into visual images. This is followed by the last stage, the complex coding of traces or their
inclusion into a system of categories. This stage involves the storage of information into long-term memory. This long-term memory is considered to consist of three sub-units: episodic memory, semantic memory, and imagery memory. The images in imagery memory do not seem to be stored in any verbal code, yet they can be activated by associations from other subunits. For example, for children to verbally recall information from an illustration, they must have simultaneously stored the image and the verbal code (language) for that image (Hittleman, 1985). The coding which takes place in this last stage is a complex process and, with regard to the processing of verbal versus visual material, there may not be a distinct dichotomy as has been proposed by Paivio.

Within the context of right and left hemispheric processing, there is evidence against the verbal/nonverbal dichotomy, or Paivio's dual-coding hypothesis which is akin to this. The repeated observation that a right-hemisphere superiority is not an inevitable concomitant of nonverbal stimulation in general, or of face-processing tasks in particular (Bevilacqua, Capitani, Luzzatti, & Spinnler, 1979; Marzi, & Berlucchi, 1977; Patterson, & Bradshaw, 1975), but depends upon such factors as task or stimulus familiarity, complexity, or difficulty (Besiach, Nichelli, & Sala, 1979; Ornstein, Johnstone, Herron, & Suenchonis, 1980), or required storage duration (Mocovitch, Scullion, & Christie, 1976), all favour some more general distinction such as the analytic/holistic view (Bradshaw, & Nettleton, 1981).

With regard to the disappearance of memory traces or forgetting, previous views that forgetting is the natural result of the gradual
extinction or decay of the trace have been revised (Luria, 1973). More recently, the view is held that forgetting is the result of inhibitory influences of irrelevant or interfering actions on the traces, inhibiting their normal recall, rather than the result of their gradual decay (Keppel, 1968; Postman, 1963; Underwood, 1957; Underwood, & Postman, 1960). Recall is a special form of mnestic activity, determined by special motives and by the task of recalling the appropriate material. Certain strategies and appropriate methods or codes are used which increase the volume of recallable material, increase the time during which it can be retained, and sometimes, abolish the inhibitory action or irrelevant, interfering agents. Erdelyi and Kleinbard (1978), conducted experiments which support the idea that certain classes of stimuli, particularly meaningful pictures, may be hypermnesic rather than amnesic, increasing over time and recall attempts.

Important implications for pictorial instruction arise from research about memory processes. It has been noted by Berry (1980) that children may experience problems in remembering information from illustrations unless the images are translated into semantic forms. While this may occur automatically for some children, a number of suggestions are made by Hittleman (1985) to enhance the use of illustrations. He suggests that effective storage will occur if the picture children are to remember is immediately associated with words, first oral then written. Further, it is suggested that the language used should link the information in an illustration to some specific context, should provide an opportunity for children to rehearse their knowledge, and should be
specifically confined to the processing of one picture at a time in order to avoid memory interference. In a study conducted by Carr, Bacharach, and Mehner (1977) it was found that advance verbal descriptions enhanced children’s retention of component information from pictures. Description resulted in higher retention of all components, including unmentioned items. Koenke (1980) states that one should not assume that children, particularly poor readers, are capable of apprehending and integrating pictorial information independently.

It has been said that a clear conception of the instructional potential of pictures is missing (Brody, 1984). Some research, however, has been directed towards whether pictures could serve functions usually associated with nonpictorial methods of instruction.

In some studies pictures have been used as visual advance organizers in a similar fashion to their counterparts: verbal or expository organizers. Weisberg (1970), as discussed previously, reported that a map and a graph functioned effectively as visual advance organizers. Nichols (1983) notes that the use of pictures to induce prediction in advance of a lesson is an effective instructional device. Ausubel (1963) has long advocated the use of illustrations as organizers when the material to be learned is complex; pictures can serve, in this way, to activate the student’s background knowledge and existing schema. Dean and Kulhavy (1981), in experiments with undergraduates, found that those learners who were forced to process a map prior to reading significantly outperformed on recall measures those given no map, or those given a map but not instructed to study it. These authors make the point
that learners do not process an organizer merely because it is presented, and that such an unwarranted assumption may account for the no difference verdict often shown with advance organizers.

As another example, subject-generated pictures or maps, created concurrently with text processing, may serve a note-taking or organizational function. In a number of studies, evidence has been found that creating a map-like structure while learning a passage can significantly enhance retention (Snowman, & Cunningham, 1975; Dean, & Kulhavy, 1981).

Brody and Legenza (1980) suggest that pictures may serve a review function similar to the general review function served by questions that are placed after reading passages (Rickards, 1979).

Some studies have investigated the use of different combinations of media on learning.

For example, Dwyer (1973;1971) has conducted several studies investigating the effectiveness of different methods of presenting visualized instruction. In one study (1971) the use of written questions as advance organizers to visualized instruction was examined. Based on the results Dwyer concluded that questions were not an effective means for increasing students' achievement on different types of criterial measures. In another study (1973), again with college students, written questions, which were designed to focus attention on relevant learning cues in an illustration, were placed before content, after content, or were omitted. Results showed that subjects receiving instruction without questions achieved as well as subjects receiving visualized instruction complemented
by questions. Although questions were used in these studies, they were
presented in the same media as the content, that is, in written form.

A study where questions were orally presented as an accompaniment
to factual discourse was conducted by Rohwer and Harris (1974) with high
socioeconomic status (SES) white and low-SES black fourth-grade children.
Results from experiments showed that, on short-answer and free recall
methods, for the low-SES black children, performance in the combined media
conditions, especially in oral plus pictures, was superior to that in
single-media conditions, whereas among high-SES white subjects
combinations of media were of little benefit.

In another study Snowman and Cunningham (1975) compared the effects
of pictorial and written questions interspersed through text on factual
recall. Students received one of the following forms of text: questions
before relevant passage, questions after, pictures before, pictures after,
questions and pictures before, questions and pictures after, no adjunct
aids. Adjunct aids appearing after the textual passage were found to be
superior to those appearing before, except in the case of pictures before
which were superior to pictures after on practiced items. The superiority
of practiced items over nonpracticed items was also demonstrated. In
general, reader-generated pictures and experimenter-provided questions
were equally facilitative and resulted in increased retention over the
control group. The authors conclude, however, that there have been few
attempts on the part of those interested in prose learning to explore the
implications of employing both types of stimuli, visual and verbal, so
that even tentative generalizations cannot be drawn.
The comparative effectiveness of different types of illustrations has also been investigated. Duyer (1973) found evidence that the use of colour and more realism in illustrations of the heart facilitated achievement, but only for a programmed method of instruction as opposed to a slide/audiotaped method of instruction. In another experiment Duyer (1971) found that simple line drawings were most efficient in facilitating achievement. Joseph and Duyer (1984) concluded from an experiment that students with moderate and high levels of knowledge may benefit from realistic visualization, depending on the pacing of instruction and objectives to be achieved. In another study, reviewed earlier (Rusted, & Coltheart, 1979), the inclusion of colour and additional detail within pictures had no effect on any of the measures analyzed. Fau and Nunelly (1967), however, conducted a series of experiments with college students and found that the subjects paid the most attention to complex and novel pictures. The study was replicated (Fau and Nunelly, 1968) with elementary school children with the same results. The issue of complexity is not as well defined, however, as this and other research (Hochberg, & Brooks, 1978 Mackworth, & Morandi, 1967; Zusne, & Michels, 1964) would seem to indicate. Wolf (1970) found that complexity seems to attract more eye fixations, but only up to a point. When the stimulus becomes extremely complex, the subject may tend to avoid the stimuli or to fixate centrally.

Practical application of these findings is difficult since it is probably not so much whether illustrations are simple or realistic, or colour or black and white, which influences their effectiveness, but more
the interaction between the method of instruction, the learner's level of background knowledge, and type of text material which is used that determines the ultimate effectiveness of illustrations.

E. Summary

Four avenues of pictorial research have been discussed: the effects of illustrated versus non-illustrated text, the characteristics of eye movements and picture viewing behaviour, the relevant aspects of imagery research, and the practical applications of learning and memory theory.

A number of points emerge from the research exploring the effects of illustrated versus non-illustrated text. First, text accompanied by illustrations appears to facilitate better comprehension and recall of passages than text without illustrations. This effect has been shown in studies involving subjects from the age of 7 to 15. This positive effect has been demonstrated for both material which is illustrated, and for material only found in the text. Second, experimenter-provided pictures are more effective than subject-generated elaboration or experimenter-provided verbal elaboration. Visuals, as advance organizers, appear to produce superior recall of material than expository advance organizers. Females may outperform males on picture/word association tasks. The differences found between illustrated and non-illustrated conditions are greater in delayed recall measures than in immediate recall. Poor readers
may make more use of pictures than good readers. Text organization does not appear to affect the degree to which pictures may produce a facilitative effect. Students with high prior knowledge may benefit more from realistic illustrations. And, finally, instruction to look at or pay attention to pictures does not appear to enhance their positive effect on recall.

The types of text used in these studies include both narrative and expository. Twelve of the studies reviewed in this section employed content materials (Covey, & Carroll, 1985; DeRose, 1975; Duchastel, 1980; Flagg & Weaver, 1981; Joseph, & Dwyer, 1984; Hayes, & Readence, 1982, 1983; Levin, Shriberg, & Berry, 1978; Rusted, & Coltheart, 1979; Weisberg, 1970), while five of the studies reviewed dealt with narrative materials (Borges, & Robins, 1980; Donald, 1983; Haring, & Fry, 1979; Levin, Bender, & Lesgold, 1976; Peeck, 1974). The narrative studies selected were included because of their focus on learning from reading, rather than on learning how to read.

Although the majority of the studies reviewed were concerned with expository material, the studies involving narrative material represent only a very small proportion of similar studies. Brody (1981), for example, points out that in the field of pictorial research, most verbal treatments used are written in narrative or prose styles rather than the expository style usually found in instructional texts; he adds that this tendency is evidence of the unwillingness to discriminate between learning to read and learning from reading. Brody (1981) cautions, however, that
even when materials, written in an expository style, are included they may not be representative of those found in instructional texts. In addition, Brody (1971) also draws attention to the need for studies based on academic areas other than science or mathematics, such as language arts or social studies.

While the studies reviewed here have found at least a modest facilitative effect for the use of illustrations in comprehending and recalling prose passages, there are numerous studies which have failed to show a positive effect. In fact, it has been asserted that among the attempts to confirm the value of text illustration, more seem to have failed than to have succeeded (Duchastel, 1980). Yet, rather than a continued focus on whether or not the mere presence of pictures in text is beneficial, there is a need for research to be directed, instead, on methods of instruction that can enhance the facilitative effects of pictures. As Denburg states (1977), it is not enough to examine whether illustrations can enhance learning; one must also examine why or how they can do so.

In the majority of studies reviewed in this section, the materials used were experimenter-designed, and often the passages used were unrealistically brief. Brody (1981) states that the development of meaningful results in the area of illustrated versus non-illustrated text is made more difficult by the use of pictorial illustrations not representative of those found in instructional textbooks. Thus, there appears to be a need to investigate picture effects within the typical
textbooks students encounter in their classroom.

In all but one study (Duchastel, 1980) reviewed, the testing of delayed recall was often measured within a few hours or days of the initial exposure and immediate testing. In view of the trend towards greater picture facilitation effects on delayed recall compared to immediate recall, it is surprising that the effects in delayed recall have not been further tested by arranging longer delays from the time of initial exposure.

The studies concerned with eye movements and picture viewing behaviour highlight a number of points: it is not the exposure time given to illustrations but the number of eye fixations which occur that influence recall performance, observed patterns of picture viewing behaviour during the reading of text materials are idiosyncratic and haphazard, the capacity for remembering pictures is superior to that for remembering linguistic material, and finally, teachers should be concerned with student viewing behaviour of pictures, since the instructions given at the time of viewing, influence the degree of pictorial information processing. As pointed out by Dean and Kulhavy (1981) and Holliday (1976) to ensure that detailed text illustrations are inspected carefully and "deep processed," very strong attentional prompts may be required.

The research studies employing imagery techniques reveal several trends. First, the ability to use imagery is developmental, beginning about the age of 7 or 8. Second, older students may not benefit to the
same extent from imagery instruction as younger students, since it is hypothesized that older subjects may automatically engage in dual-encoding without prompting. Third, gender differences suggest that high-imagery females may benefit from imagery instruction more than males. Finally, theories which seek to explain the facilitative effect of pictures include the idea that pictures offer a medium that requires more than one level of processing, and that methods of instruction that which utilize the integration of verbal and visual stimuli will enhance the facilitative effect of imagery or pictorial instruction.

Among the points presented in the review of literature pertaining to theories of learning and suggested instructional strategies was the concept that interfering, irrelevant influences lead to forgetting. Thus, if one were to revise Paivio's dual-trace theory in the light of this theory, the verbal trace does not decay but is, instead, not so resistant to interfering influences as the imaginal trace. An instructional suggestion made was that a method combining oral adjuncts with pictures is superior to a method combining written adjuncts with pictures.

Although the complexity of Social Studies texts cannot be compared to the single words and pictures used in paired-associate studies, such studies have possible relevance for content area methods of instruction by suggesting procedures which may enhance learning.

In sum, there have been relatively few studies directed to the identification of methods of instruction which will enhance and maximize
picture benefits. Few studies have utilized actual text material used in regular classrooms. In addition, the adequate testing of delayed recall in picture-related studies appears to be missing from these studies.
The purpose of this study was to investigate whether students who are required to process the pictures in their Social Studies textbooks in a structured manner (integrating picture with text content) would achieve better comprehension and recall of the accompanying connected prose than those who pay only incidental attention to the pictures (focusing, instead, on text content). Also examined was whether such instruction is best directed at a particular reading ability group or gender. Data obtained were examined to determine whether there were significant differences in either grade in performance between the experimental and control groups on either immediate or delayed test measures.

This chapter will describe the research design and data analysis, the selection and nature of the sample, the instructional materials, the testing instruments, and the procedures of the pilot and the main study.

A. Design and Data Analysis

To examine the effects of a visually structured lesson with fifth and seventh grade students, a "quasi-experimental pretest-posttest non-equivalent control group" design was used (Borg & Gall, 1983, pp. 682-684; Campbell & Stanley, 1969, pp. 46-50), also known as a "compromise experimental group-control group" design (Kerlinger, 1986, pp. 315-316). This design was chosen because it was not possible to randomly assign students to the experimental group (structured training) or to the
conventional group (directed reading), but rather, the use of intact classroom groups was necessitated.

To control for the main threat to internal validity (Borg & Gall, 1983; Kerlinger, 1986) that initial group differences in reading comprehension might pose, the standardized measures, the Gates-MacGinitie Reading Test (for the grade 5 students) and the Stanford Diagnostic Reading Comprehension subtest (for the grade 7 students), functioned as pretest scores. These scores were used as covariates in the Analysis of Covariance test to factor out initial reading differences, in an effort to ensure that any differences observed on the posttests (immediate and delayed multiple choice and short answer recall tests) were not attributable to pre-experimental group differences in reading comprehension.

For the analysis of covariance and the F test to be appropriate, three assumptions are made: 1) normality, 2) homogeneity of variance, and 3) random sampling (Spatz & Johnston, 1984). To consider these in the present study, normality is met when the dependent variable is normally distributed in the populations from which samples are drawn. Research has suggested that comprehension and recall of the type required by the dependent variable in this study, are normally distributed (Danner, 1976; Meyer, 1984; Meyer, Brandt & Bluth, 1980; Taylor, 1980). The homogeneity of variance assumption was met in this study by calculating the test statistic F for each measure. Finally, to consider the third assumption, although the samples were not randomly selected they can be considered reasonably representative of fifth and seventh grade students in Canada when their standardized reading scores are compared with local and
Six hypotheses concerned with performance on post-tests, subsequent to treatment condition, were stated. Analysis of Covariance, using scores obtained from the standardized reading tests as covariates, were employed to test each hypothesis. The independent variables were condition (control, experimental), reading ability (low, middle, high), and gender (male, female). The dependent variable was the performance or achievement level attained as measured by each of the four testing instruments (Immediate tests: Multiple Choice and Short Answer Recall; Delayed tests: Multiple Choice and Short Answer Recall). The level of significance for testing the differences was set at \( p < .05 \). The data were analyzed using the Statistical Package for Social Sciences (SPSS), at the University of British Columbia Computing Centre.

B. Selection of the Sample

In this section the subjects, the schools, and the teachers involved in the study are described.

1. Selection of Subjects

Subjects were from four large public schools in the Vancouver School District; a total of 363 students were involved in the study. Of these, 214 were grade five students, and 149 were grade seven students. Based on information obtained from School Board officials, all four schools may be considered representative of low to middle socioeconomic levels. However, because the schools have large student populations, each school has two
intact classes at the grade 5 and 7 level, and thus, it was possible, in the same school, to have one class function as a part of the control group and one class function as part of the experimental group. In this way, it was hoped, socioeconomic factors were even further controlled. Eight grade 5 classes and six grade 7 classes were involved in the study.

Based on data obtained from the students, 30% of the grade 5 students speak English at home, 41% speak Chinese, 19% speak Hindi, and 10% speak some other language. Among the grade 7 students, 26% speak English at home, 45% speak Chinese, 22% speak Hindi, and 7% speak some other language. Vancouver School Board Survey data obtained in 1982 revealed that 45.5% of the total school population spoke English as a second language. Thus, the large ESL population in Vancouver schools is rather dramatically reflected in these schools selected, with approximately 70% of the subjects selected for this study speaking a language other than English at home.

The grade 5 and 7 levels were selected because: 1) few studies have been conducted at either of these grade levels which focus on the effects of integrated picture/text instruction, 2) content area texts are increasingly used from grade 4 upwards, 3) few studies involving pictures have utilized actual textbooks in current classroom use, and 4) the developmental aspects of the ability to make use of pictorial instruction have not been fully clarified. It has been reported in the literature that the ability to make use of pictures is usually apparent by the age of 7 or 8, and increases with age (Dirks, & Neisser, 1977; Jensen, & Rohwer, 1965; Levin, Davidson, Wolff, & Citron, 1973; Wolff, & Levin, 1972). It has been suggested that older students may not benefit from attempts to
promote this ability, as dual picture encoding becomes automatic with these students (Snodgrass, Volvovitz, & Walfish, 1972). Thus, two grades, one with younger students, and one with older, more mature students, were examined in an effort to explore these developmental aspects.

2. School Selection

The schools were selected on the basis of number of classes at the grade 5 and grade 7 level. All the schools have at least two intact, non-streamed grade 5 and grade 7 classes. In addition, permission to conduct the study was required from the Vancouver School Board (see Appendix A for copy of letter), and from the school principals and the teachers involved. Permission to conduct the study was also obtained from the U.B.C. Human Subjects Committee (see Appendix B for permission form). Each of the two classes at the same grade level and school were randomly assigned to one of two treatment groups, control or experimental.

3. Teachers

The regular classroom teachers conducted the lessons and administered all testing materials. In both the control and experimental groups, the teachers who were involved were experienced teachers with at least 5 years of teaching experience. In order to avoid the Hawthorne Effect the investigator did not conduct any of the lessons, or administer any of the tests.

The teachers were given instruction on an individual basis by the investigator as to how to conduct the lesson and administer the
non-standardized tests, in three separate sessions: At the first session, one week before the study, teachers were acquainted with the materials and the time allotments required of the study. At the second session, one to three hours before conducting the lesson, teachers were instructed in how to conduct the actual lesson, and in the manner of test administration. An appointment for delayed testing two weeks later was also arranged at this time. At the third and final session, ranging from 30 minutes to 2 hours before administering the delayed tests, teachers were instructed in how to conduct the delayed testing.

C. Instructional Materials

The instructional materials used in the study were prepared by the investigator for each grade and treatment group, and included: 1) teacher instructional handbooks, 2) student text booklets, and 3) testing instructions booklets for teachers.

1. Teacher Instructional Handbooks

All teachers were provided with a Lesson Procedure booklet and Testing Instructions booklets for both the immediate and delayed testing. The lesson procedure booklets contained general information about the nature and extent of the study, specific instructions for conducting one 30 minute Social Studies lesson, and a detailed outline of the lesson itself. The control and experimental group teachers received identical booklets, except that the lesson outlines differed.

a) Conventional Lesson Materials
The lesson outline for the control group consisted of specific questions that the teacher was to address to the class, which were to be interspersed with the students' silent reading of text passages. All questions focused on text content only. Some questions were to be answered by the students in written form, while most answers were to be given orally. In much the same manner as a guided silent reading lesson, subjects in this group were set purposes for reading a section of the text passage and were then asked questions afterwards to check their comprehension and recall (see Figures 2 and 4 for examples at each grade level).

b) Experimental Lesson Materials

The lesson outline for the experimental group was identical to the control group except that some questions, which were similar in nature to the control group, focused on obtaining answers from the pictures, instead of solely from the text. Again, the teacher's questions were interspersed with students' reading of the text pages, and in this way, picture content (visual) was integrated with the text material (verbal). In a similar fashion to the control group, some of the teacher questions were answered in written form, while most answers were given orally. The experimental/picture group were asked to look at the pictures before and after reading the text. The pictures not only served a preliminary schema-activating and predictive function before reading, but also provided concrete visual frameworks, or structures for questioning after reading. For this reason, the experimental lesson was considered a "visually structured" lesson. The subjects in this group were first asked questions seeking to relate
Figure 1. Grade 5 experimental treatment - visually structured lesson: one picture example.

<table>
<thead>
<tr>
<th>Teacher Question or Direction</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Look at the picture on page 347. Is this a painting or a photograph?</td>
<td>Activate Schema</td>
</tr>
<tr>
<td>Why do you think it’s a painting?</td>
<td></td>
</tr>
<tr>
<td>What is happening in the picture?</td>
<td>Elicit Main Idea of Picture</td>
</tr>
<tr>
<td>Can you guess what they are building?</td>
<td></td>
</tr>
<tr>
<td>Read the word under the picture to see if you can find out who the school is for.</td>
<td>Integrate Picture/Text Content</td>
</tr>
<tr>
<td>What are immigrants?</td>
<td>Check Vocabulary Comprehension</td>
</tr>
<tr>
<td>Read page 346 to see if you can find out how the Ukrainians felt about having a school.</td>
<td></td>
</tr>
<tr>
<td>If you finish before other people, read the page again because you will be asked some</td>
<td>Set a Purpose for Reading</td>
</tr>
<tr>
<td>questions about it later.</td>
<td></td>
</tr>
<tr>
<td>Stop reading now. How did the Ukrainians feel about having a school built?</td>
<td>Check Comprehension and Recall</td>
</tr>
<tr>
<td>Can you see in the picture where the teacher would live?</td>
<td>1. Integrate Picture/Text Content</td>
</tr>
<tr>
<td>Why not? What did the teacher live?</td>
<td>2. Visually Structured Review</td>
</tr>
<tr>
<td>Could there be any trustees in the picture? Why?</td>
<td>1. Integrate Picture/Text Content</td>
</tr>
<tr>
<td></td>
<td>2. Visually Structured Review</td>
</tr>
</tbody>
</table>
Figure 2. Grade 5 control treatment - guided silent reading lesson: one text section example.

<table>
<thead>
<tr>
<th>Teacher Question or Direction</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>This booklet is about the children of Ukrainian immigrants and what happened to them at school.</td>
<td>State Main Idea of Text</td>
</tr>
<tr>
<td>What are immigrants?</td>
<td>Check Vocabulary Comprehension</td>
</tr>
<tr>
<td>Read just this first page, page 346, to see if you can find out how the Ukrainians felt about having a school. If you finish before other people, read the page again because you will be asked some questions about it later.</td>
<td>Set a Purpose for Reading</td>
</tr>
<tr>
<td>Stop reading now. How did the Ukrainians feel about having a school built?</td>
<td>1. Check Comprehension and Recall</td>
</tr>
<tr>
<td>Where did the teacher live?</td>
<td>2. Review</td>
</tr>
<tr>
<td>Do you remember whose father was a school trustee?</td>
<td></td>
</tr>
</tbody>
</table>
**Figure 3. Grade 7 experimental treatment - visually structured lesson: one picture example.**

<table>
<thead>
<tr>
<th>Teacher Question or Direction</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Picture on page 285) What are some things in this picture that are different than what you would see in this country?</td>
<td>Activate Schema</td>
</tr>
<tr>
<td>Now read from the middle of page 284 to the last page of the booklet. Try to find out what are some of the things the Mbuti make. If you finish ahead of others, read these pages again.</td>
<td>Set a Purpose for Reading</td>
</tr>
<tr>
<td>Stop reading now, and look at the picture on page 285 again. Can you see two things the Mbuti make with bark? What might one man be making from vine? What two things do they make from saplings? You can see only one. What two things on the ground are made from wood slowly hardened in a fire? Well done!</td>
<td>1. Integrate Picture/Text Content 2. Provide Structured Review Positive Reinforcement</td>
</tr>
</tbody>
</table>
**Figure 4.** Grade 7 control treatment - guided silent reading lesson: one text section example.

<table>
<thead>
<tr>
<th>Teacher Question or Direction</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Now read from the middle of page 284 to the last page of the booklet. Try to find out what are some of the things the Mbuti make. If you finish ahead of others read these pages again.</td>
<td>Set a Purpose for Reading</td>
</tr>
<tr>
<td>Stop reading now. Can you tell me two things the Mbuti make with bark? What do the Mbuti make with vine? Can you think of two things they make from saplings? What two things do the Mbuti make with wood which has been slowly hardened over a fire?</td>
<td>Check comprehension and recall Review</td>
</tr>
<tr>
<td>Well done!</td>
<td>Positive Reinforcement</td>
</tr>
</tbody>
</table>
the picture content with their own background knowledge, the main idea of
the picture was discussed, and a purpose related to the picture was set
for reading a section of the text. After most of the class had had
sufficient time to read the text section, students were again asked to
look at the picture while answering questions. Questions were designed in
order that the picture would serve a review function; students had to
examine the pictures carefully for evidence of information read about in
the text. Students were then asked to look at the next picture, and the
same procedure was followed for each text section (see Figures 1 and 3 for
examples at each grade level).

In both lesson outlines, the questions focused on drawing out the
main ideas and details of the text passages. Both groups received
approximately the same number of questions, with one group focusing
solely on the text, and the other group focusing on the text and pictures.
The text for each group, experimental and control, was parsed in identical
sections for question and discussion. Both treatment groups were allowed
exactly 30 minutes to complete the lesson. Careful timing was stressed.
The Lesson Procedure instructions and lesson outlines for each treatment
group and for each grade are included in Appendix C.

2. Student Text Booklets

All students were provided with researcher produced text booklets
containing pages reproduced from Social Studies textbooks. The texts used
in the study are those designated by the British Columbia Ministry of
Education for grade 5 and grade 7 Social Studies (see Conner, 1986;
Neering, & Grant, 1986), and which are currently in use in most of the
elementary schools of the Vancouver School District. The pages selected were from the latter half of these textbooks, and the students had not been exposed to them previously. These pages were reproduced exactly as they appeared in the textbooks themselves, including colour photographs, and colour headings (see Appendix D for letters of permission from the publishers concerned). Both the control and experimental groups received the same text booklets.

For the grade 5 students, the booklets consisted of four black and white and colour pictures (two black and white photographs, and two colour reproductions of paintings), and four pages of expository text (see Appendix E). The two black and white photographs are reasonably large, occupying approximately half of one page each. Both contain many details, and are likely to attract a high level of interest as their subject is of common interest to students: fellow students, but at schools in the early 1900's, are pictured. The two colour reproductions of paintings contain a lesser amount of detail, and differ in their size; one picture occupies a full page of the text, while the other, is a relatively small picture of approximately 2" x 2". Appearing above or below all four pictures are adjunct questions. The accompanying connected prose is written at a Dale-Chall readability level of grade 5.4, using the Correction Table, at a 5th to 6th grade level (Dale & Chall, 1948).

For the grade 7 students, the booklets consisted of five black and white and colour pictures (all photographs, except for two black and white outline drawings), and 5 pages of expository text (see Appendix E). Of the three photographs, two are in colour and one is black and white. The two colour photographs are very small, approximately 2" x 2" in size,
while the black and white picture is larger, approximately 3" x 4" in size. Because the colour photographs are so small, clarity and detail suffers. The black and white photograph is more complex, revealing more detail. The two black and white outline drawings are more simple, and less complex than any of the photographs; one of these illustrates animals of the Ituri rain forest and occupies almost a full page of text. The other, picturing a Mbuti native collecting honey from a tree, is smaller, occupying a quarter of one page. Because of the inclusion of these black and white outline drawings and of the two colour photographs that are very small in size in the grade 7 text booklets, the overall complexity of the pictures represented is probably less than that of the grade 5 text booklets. All the pictures are accompanied by adjunct questions. The accompanying expository text is written at a Dale-Chall readability level of grade 5.9, and with the use of the Dale-Chall Correction Table, is considered to be at a 5th to 6th grade level (Dale, & Chall, 1948). Compared with the grade 5 text, then, this text is, for grade 7 students, relatively less difficult to read.

3. Testing Instructions Booklets for Teachers

The Immediate Testing Instructions booklets contained specific, standardized instructions outlining in detail how the multiple choice tests and short answer recall tests were to be administered. The Delayed Testing Instructions booklets contained identical instructions to the immediate testing booklets, but the initial wording of the instructions to the class differed appropriately. For both the Immediate and Delayed Testing Instructions booklets, two versions existed. In one booklet, the Multiple Choice test was to be administered before the Short Answer Recall
test, and in the other, the order was reversed. The testing instructions booklets for immediate and delayed testing are included in Appendix F.

D. Testing Instruments

The testing instruments used differed between grade levels.

For the grade 5 sample, five instruments were used in the study: one standardized test, the Gates-MacGinitie Vocabulary and Comprehension test, Level D, Form 1, and four non-standardized tests, 1) an Immediate Multiple Choice test, 2) an Immediate Short Answer Recall test, 3) a Delayed Multiple Choice test, and 4) a Delayed Short Answer Recall test.

For the grade 7 sample, five instruments were also used: one standardized test, the Stanford Diagnostic Reading Comprehension subtest, and four non-standardized tests, 1) an Immediate Multiple Choice test, 2) an Immediate Short Answer Recall test, 3) a Delayed Multiple Choice test, and 4) a Delayed Short Answer Recall test.

In both grades, the delayed tests were administered two weeks after the administration of the lesson and the immediate tests.

1. Standardized Measures

a) Gates-MacGinitie Reading Test (Grade 5 students)

The Gates-MacGinitie Reading test, Level D, Form 1 (Canadian Edition, 1978-1979) was administered, during the three week period allowed for the study, to all grade 5 classes involved in order to provide a covariate to be used with scores obtained from the non-standardized measures. It was also used to delineate three reading groups in order to
answer the question about reading ability level. Students who obtained a combined (Vocabulary and Comprehension) t-score of 49 or higher were classified as high ability readers, those with a combined t-score between 41 and 48 were classified as middle ability readers, and those with a combined t-score of 40 or lower were classified as low ability readers.

The Gates-MacGinitie Reading test was chosen for a number of reasons.

The test items have been developed so that they have an "international character," an important consideration in the light of the large proportion of ESL students in the sample selected for this study. The content of the test items was designed to be within the experience of students from diverse backgrounds, so that items with apparent bias were eliminated. Comprehension subject matter is comprised of 60% content material, and 40% narrative material. This weighting reflects the wide amount of content area reading that intermediate grade students encounter in their classes.

Canadian norms were derived based on a total sample of 46,000 students. The sample was drawn to reflect different urban settings and different types of schools. The norming group was chosen to be representative of English-speaking students in Canadian schools at each grade level. Because of the inclusion of schools of different urban settings, the test seemed appropriate for use in the present study.

The test was constructed to assure validity for most school reading programs. All items were carefully examined by a group of Canadian educators, items being modified or omitted on the basis of their recommendations. The standard time allotment for this test enables all
but the slowest students to attempt each question.

The test was also deemed to have acceptable levels of reliability, the Kuder-Richardson Formula 20 reliability coefficients on the Canadian Edition, Level D or grade 5 level, are 9.0 on the Vocabulary test, and 8.9 on the Comprehension test.

This test is widely used within the Vancouver School District and is an accepted measure of reading vocabulary and comprehension.

b) Stanford Diagnostic Reading Test (Grade 7 students)

The Stanford Diagnostic Reading Test (1976) is administered in September to all grade 7 classes of the Vancouver School District. All the grade 7 classes involved in the study used the Brown Level, Form B in September of 1986. Scores from Test 2 Reading Comprehension were obtained from the six classroom teachers involved, and used as a covariate in the analysis of the non-standardized test scores. Scores were also used to create reading groups to investigate reading ability effects. Those students with grade equivalents of 8.6 and above were classified as high ability readers, those with grade equivalents ranging from 6.4 to 8.5 were classified as middle ability readers, and those with grade equivalents of 6.3 or less were classified as low ability readers.

The test was developed by the authors to serve as a diagnostic and instructional tool, which in its editing and reviews sought to eliminate sources of ethnic, cultural, racial, and sex bias. Each item in the test was reviewed and edited for content and style and for its appropriateness for measuring stated objectives.

In standardizing the test, school systems were selected using a
stratified random sampling technique, with socioeconomic status, school system enrollment, and geographic area as the stratification variable. In grades 2 through 9, 25,000 students were tested. The standardization sample was chosen to be representative of the United States national school population. The test, however, is widely in use in Canadian schools, and is routinely used by the schools of the Vancouver School District.

The content validity of the test must be determined by inspecting the test's content and matching it with the objectives of the local reading program. The objectives written by the authors were written to reflect the content of reading programs in common use throughout the United States. The criterion-related validity of this test was established by correlating scores of the Stanford Diagnostic Test with scores from another standardized test.

The reliability for the reading comprehension subtest, calculated by the Kuder-Richardson Formula 20 is .95 for the grade 7 level, Form B, an acceptable level of reliability.

2. Non-Standarized Measures

Two tests, a Multiple Choice test and a Short Answer Recall test were designed for each grade level to measure comprehension of the connected prose appearing in the student text booklets. These two test were administered immediately after the 30 minute Social Studies lesson. These same two tests were also administered two weeks later, but the format of the tests was altered. The same question items appeared, but in different sequence to the initial tests. The preliminary personal
data that was asked for also differed. The colour of the paper used was also different to further disguise the fact that the same tests were being used.

a) Multiple Choice Test

The Multiple Choice test was included as a testing measure along with the Short Answer Recall test because a multiple choice test has the advantage of avoiding the ambiguity and vagueness which, it has been said, frequently are present with short answer items (Gronlund, 1976). The Multiple Choice tests consisted of ten questions, each with four options.

Several principles were observed in designing the Multiple Choice tests, based on suggestions from a number of authors (Ebel, 1979; Gronlund, 1976; Hopkins, & Antes, 1985; Lien, 1980; Satterly, 1981). First, the stem for each question on the grade 5 test was written in the form of a direct question as this is considered easier for younger pupils to understand. The stems on the grade 7 test, were written in the form of incomplete statements, a more appropriate form for this grade level (Gronlund, 1977). Second, it was decided to include four choices for each question. Theoretically, four or more choices help reliability. As the number of alternatives is reduced the chance of guessing the correct response increases. Third, textbook wording was avoided in order to go beyond rote learning and more stringently test comprehension. All the options in each question were kept to roughly the same length, and each was written to be mutually exclusive. An attempt was made to make all the options for each question equally plausible, and alternatives were arranged in alphabetical, numerical, or appropriate order whenever there was a certain sequence among them (see Appendix G for examples of the
Immediate and Delayed Multiple Choice tests used at each grade level).  

The reliability of the immediate tests was assessed by calculating the degree of correlation between scores obtained on this measure with scores obtained on the delayed measure. Test-retest reliability was measured as .6 for the grade five group and .7 for the grade 7 group, which represent moderate to high levels of reliability.

b) Short Answer Recall Test

The Short Answer Recall tests consisted of one page of six questions for the grade 5 students, and one page of seven questions for the grade 7 students. Students were asked to recall as much information as they could remember. This type of test was included in the study since written recall apparently yields a clearer perspective of a learner's comprehension (Brooks, 1983; Holly et al., 1981) than measures that require students to select an appropriate answer. Examples of the immediate and delayed Short Answer Recall tests used at each grade level appear in Appendix H.

With respect to the question of content validity, the main ideas and details of each passage were extracted and from these, items were selected for the two tests to give a representative sampling of the passage content.

The question of criterion-related validity of these tests was addressed by comparing students' relative amount of achievement obtained on these non-standardized tests with the relative amount of achievement obtained on the standardized measures.

The reliability of the immediate tests is assessed by calculating
the degree to which performance on these tests correlates with performance on the delayed tests. On the short answer tests the test-retest correlation (Pearson r) was .8 for the fifth graders and .7 for the seventh graders. These are considered moderate to high levels of correlation for this type of test.

E. Procedures

Prior to the main study, a pilot study was conducted. The main study was conducted in four stages: 1) the 30 minute Social Studies lesson coupled with the immediate testing, 2) the delayed testing, 3) the collection of standardized reading scores, and 4) the scoring.

1. Pilot Study:

The pilot study was conducted primarily to assess the timing, instructional clarity, and administration difficulty of the lessons and testing instruments. One grade 5 class and one grade 7 class from each of two private parochial schools in Vancouver were involved. One school was in a low socioeconomic area and the other was in a high socioeconomic area. In spite of these differences, however, it was felt expedient to use these schools since the main purpose of the pilot study was not to investigate treatment effects, but to assess and refine the procedures and materials.

The classes which functioned as the control groups in the pilot study were given no instruction but simply told to read and study the text
pages. In the experimental groups, the teachers asked oral questions focusing on picture content. Both groups were exposed to the materials for 30 minutes.

Based on classroom observations of the pilot study lessons and testing periods, a number of changes were made to the materials and to the lesson procedures for the main study.

First, it was observed that the control groups had more than an adequate amount of time to study the materials and became restless. The experimental groups, on the other hand, did not have an adequate amount of time to independently read the text passages. It was decided, therefore, to alter the lesson outlines so that both groups would receive the same amount of instructional time, and the same amount of independent time to read the text passages. Introducing instruction into the control lesson was considered to improve the validity of the study comparison as well; variables were more tightly controlled (both groups were to receive instruction) since the only difference between treatment groups was to be the focus give to pictures in the experimental groups.

It was also decided to refine the lesson outlines so that instead of questioning before a text section only, subjects were to be asked questions before and after text sections. As well, both treatment groups would read the same text sections.

The timing allowed for each test was altered from 10 minutes to 8 minutes for the Short Answer Recall test, and from 8 minutes to 6 minutes for the Multiple Choice test. These time allowances were found to be adequate for all students in these classes to complete the tests and check their answers.
Because the rate of achievement was rather high on the Multiple Choice tests, several literal question items were removed and replaced with questions seeking inferential information. In addition, based on the responses obtained, a number of questions on the Short Answer Recall tests were rewritten to clarify their meaning. Questions on both tests were scrutinized to ensure that no questions were identical to those asked in the lesson outlines.

In summary, the following changes were made:

1) Lesson outlines were altered so that both groups (experimental and control) would receive the same amounts of instructional and independent reading time.

2) Questions to be asked after the reading of a text section were added to the lesson outlines.

3) Timing for both the Multiple Choice and Short Answer tests was adjusted, from 8 minutes duration to 6 minutes, and from 10 minutes to 8 minutes, respectively for each test.

4) Several literal multiple choice questions were replaced with those demanding inferential information.

5) Some questions from the short answer recall test were rewritten to clarify their meaning.

2. Main Study:

a) Lesson and Immediate Testing

Two teacher orientation meetings were held with each individual teacher before they conducted the 30 minute lesson. At the first meeting, each teacher was provided with a general overview of the study and an
appointment time for the second meeting and lesson implementation was
scheduled. At the second meeting, teachers were given standard
instructions about the lesson presentation, and the teacher's
instructional booklet was explained. Testing procedures were also
outlined, and the Testing Instructions Booklet, explained.

Shortly after the second meeting, always on the same day, the
teachers conducted the 30 minute Social Studies lesson and administered
the two Immediate tests, the Multiple Choice test, and the Short Answer
Recall test. The investigator did not enter the classrooms while the
lessons were being conducted. Materials and testing instruments were
collected after use on the day of the lesson, and an appointment time was
arranged for the delayed testing. This appointment time was, in all
cases, exactly two weeks after the lesson and initial tests had been
given.

b) Delayed Testing

On the day arranged for delayed testing, two weeks after the
lesson, each teacher received the delayed tests and a Testing Instructions
booklet. The two tests were administered in the reverse order to the
initial testing. In the grade 5 sample, half the classes in the control
group and half the classes in the experimental group completed the
Multiple Choice tests first in the initial testing, and the Short Answer
Recall tests first in the delayed testing. The remaining classes followed
the opposite procedure. In the grade 7 sample, three schools and six
classes were involved. Because of this, the testing procedure was divided
unevenly with two control classes completing the Multiple Choice test
first in the immediate testing and the Short Answer Recall test first in
the delayed testing, and two experimental classes completing the Short Answer Recall test first in the immediate testing and the Multiple Choice test first in the delayed testing.

c) Collection of Standardized Reading Scores

Over the three week period the study was conducted, a record of the end of September, 1986 Stanford Diagnostic Scores were collected from the grade 7 teachers. These tests are administered routinely in the Vancouver School District at the grade 7 level, and had been scored by the Vancouver School Board. These scores were used because they represented the only reading comprehension scores available which were common to all schools, and which were administered during a common time period of the school year. Since there is no test which is given routinely across schools at the grade 5 level, the grade 5 teachers involved in the study administered the Gates-MacGinitie Reading test to their classes in May, 1987, during the three week period of the study. These tests were then collected and scored by the investigator.

d) Scoring

The Gates-MacGinitie reading tests were scored according to procedures outlined in the manual. Composite Vocabulary and Reading Comprehension raw scores were recorded and converted to t-scores. T-scores were used in the analysis of the data, as they fulfilled the requirements for an equal interval scale.

The Stanford Diagnostic Reading Comprehension subtest scores were converted from raw scores to grade equivalents. These were used in the
analysis of data, as being the most appropriate form to use. Although not strictly representing an equal interval scale, these scores were the closest most reliable approximation obtainable from the tables listed in the Stanford Diagnostic Reading Test Manual.

On the non-standardized tests, a different method of scoring was required depending on test type, multiple choice or short answer.

Each question on the Multiple Choice tests had one correct answer. Students received one mark for each correct answer indicated. Questions omitted were counted as errors.

Each question on the Short Answer Recall tests had a different maximum obtainable score. Some questions asked for main ideas, and others demanded the recall of details. Figures 5 and 6 summarize for each grade the types of questions appearing on these tests and the maximum score obtainable for each question item. One mark was awarded each detail recalled, and two marks were awarded each correct main idea stated. An incomplete main idea statement was awarded one mark. Templates used in the standardized scoring of these tests are included in Appendix I.

Scores obtained on the nonstandardized measures were recorded on each subject's test and then transferred to a master data sheet which included identity number, school, grade, gender, language spoken at home, age, immediate multiple choice and short answer scores, delayed multiple choice and short answer scores, grade 5 reading t-scores, and grade 7 reading grade equivalent scores. Data were then entered on computer and analyzed.
**Figure 5. Grade 5 short answer recall test - question types and scores.**

<table>
<thead>
<tr>
<th>Question</th>
<th>Type of Information</th>
<th>Elicited</th>
<th>Answer</th>
<th>Maximum Score Obtainable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What country did the Ukrainian immigrants come from?</td>
<td>Main Idea</td>
<td>(Western)</td>
<td>Ukraine</td>
<td>2</td>
</tr>
<tr>
<td>2. What two jobs did the school trustees do?</td>
<td>Details</td>
<td>build a school hire teachers</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3. What language did Maria, Eva, and Wasyl speak at home?</td>
<td>Main Idea</td>
<td>Ukrainian</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>4. How did Petro Humeniuk feel on his first day at school?</td>
<td>Details</td>
<td>lonely, shy, bewildered, (frightened)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>5. If you went to school in the early 1900's, what things would be different? List as many differences as you can remember.</td>
<td>Details</td>
<td>only one teacher many grades on one class school only in winter a long way to walk different clothing children were Ukrainian small, wooden schoolhouse different desks teachers slept in people's houses different subjects, games</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>6. What were some of the things the children did at a school concert?</td>
<td>Details</td>
<td>sang songs recited tongue twisters sang &quot;God Save the King,&quot; &quot;Maple Leaf Forever&quot; sang Ukrainian songs</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>
**Figure 6. Grade 7 short answer recall test - question type and scores.**

<table>
<thead>
<tr>
<th>Question</th>
<th>Type of Information</th>
<th>Answer</th>
<th>Maximum Score Obtainable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The Mbuti depend ____ for all their needs.</td>
<td>Main Idea</td>
<td>the (Ituri) (rain) forest</td>
<td>2</td>
</tr>
<tr>
<td>2. One main activity of the Mbuti is ____?</td>
<td>Main Idea</td>
<td>hunting</td>
<td>2</td>
</tr>
<tr>
<td>3. Name as many animals as you can remember that are found where the Mbuti live.</td>
<td>Details</td>
<td>elephant, leopard, antelope, monkey, buffalo, woodpecker, bees, birds, fish, insects, termites wild hog, okapi, pangolin</td>
<td>9 - 14</td>
</tr>
<tr>
<td>4. Besides the animals that are hunted, what other foods do the Mbuti find in the jungle?</td>
<td>Details</td>
<td>salt, roots, nuts, fruits, mushrooms, honey, berries, (insects)<em>,</em>(termites)* (fish)<em>,</em>(bees)<em>,(birds)</em></td>
<td>7 - 12</td>
</tr>
<tr>
<td>5. Can you describe three methods the Mbuti use to hunt animals?</td>
<td>Details</td>
<td>trap with a net shoot with bow and arrow dig a pit trap</td>
<td>3</td>
</tr>
<tr>
<td>6. Why is it easy for the Mbuti to move to a new campsite?</td>
<td>Main Idea</td>
<td>they have very few possessions</td>
<td>2</td>
</tr>
<tr>
<td>7. Name as many things as you can that the Mbuti Make.</td>
<td>Details</td>
<td>nets, bows, arrows, clothing, dyes, nuts, necklaces, baskets, cutting tools, spears, armbands, (salt)*</td>
<td>11 - 12</td>
</tr>
</tbody>
</table>

* These items received a mark only if not previously listed.
CHAPTER IV. Results

It was the purpose of this study to determine whether students who are required to process the pictures in their Social Studies textbooks in a structured manner (integrating picture with text content), would achieve better comprehension and recall of the accompanying connected prose than those who pay only incidental attention to the pictures (focusing, instead, on text content). Also examined is whether such instruction is best directed at a particular reading ability group or gender.

This chapter will present the results of the study in three sections. First, the results of the standardized Gates-MacGinitie Reading Tests (Vocabulary and Comprehension), and Stanford Diagnostic Reading Comprehension subtest will be described. Second, the reliability measures used in scoring will be discussed. Third, the six hypotheses will be restated and the results of the non-standardized measures reported for each grade.

A. Standardized Measures

1. Gates-MacGinitie (Grade 5 reading scores)

Scores from the Gates-MacGinitie Reading tests (Level D, Vocabulary and Reading Comprehension subtests) were used for two purposes.

First, the scores were used to create reading groups of low, average, or high ability in the grade 5 sample. Since t-scores were used it was possible to delineate groups on the basis of approximately equal numbers in each group. Those with scores ranging from 4 to 40 were
classified as low ability readers, those with scores from 41 to 48 were
classified as average ability readers, and those with scores ranging from
49 to 68 were classified as high ability readers. Thus, scores ranged
from 4 to 69; the mean score was 45.35, with a standard deviation of 9.26.
Figure 7 provides a summary of all scores, the range, the mean, the
standard deviation, and the numbers of students in each reading ability
group for each treatment condition. Data were obtained for 214 out of 215
subjects in the sample. One student was eliminated from the study because
only one subtest of the two was completed.

Secondly, scores from the Gates-MacGinitie Reading tests also
functioned as pretest measures to control for initial reading differences
between the control and experimental groups; the scores were used as
covariates to factor out initial reading differences that may have
influenced the results on the posttest measures (immediate multiple choice
test, immediate short answer test, delayed multiple choice test, delayed
short answer test).

2. Stanford Diagnostic (Grade 7 reading scores)

Scores from the Stanford Diagnostic Reading Comprehension subtest
were also used to create reading ability groups and as covariates to
factor out initial differences in the grade 7 sample. As t-scores were
not available, grade equivalent scores were used and three approximately
equal groups were delineated. Those with scores ranging from 3 to 6.3
were classified as low ability readers, those with scores ranging from 6.4
to 8.5 were classified as average readers, and those with scores ranging
from 8.6 to 14 were classified as high ability readers. Thus, scores
ranged from 3 to 14: the combined mean for both treatment groups was 7.69 and the standard deviation was 2.4. Data were obtained for 149 out of 153 subjects, scores for four students not being available. These four subjects were therefore eliminated from the study. Figure 8 provides a summary of range, mean, standard deviation, grade equivalent scores, and numbers of students in each reading ability group for each treatment condition.

B. Scoring Reliability

All initial scoring was done by the investigator; a total of 428 immediate and delayed Multiple Choice tests, and 428 immediate and delayed Short Answer Recall tests were scored for the grade 5 sample. In the grade 7 sample, a total of 298 immediate and delayed Multiple Choice tests, and 298 immediate and delayed Short Answer Recall tests were scored.

Ten percent of the immediate and delayed Short Answer Tests for each treatment group in each grade were then randomly selected. To determine reliability these were remarked by another investigator unfamiliar with the study, using a blind scoring method. Interrater reliability was .99 (81% agreement) for the grade 5 multiple choice tests, and .99 (81% agreement) for the grade 5 short answer tests. Interrater reliability was 1.0 (100% agreement) for the grade 7 multiple choice tests, and .99 (81% agreement) for the grade 7 short answer tests.
Figure 7. Summary of Gates-MacGinitie t-scores for grade 5.

<table>
<thead>
<tr>
<th>Count</th>
<th>Midpoint</th>
<th>One Symbol Equals Approximately .80 Occurrences</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>3.33</td>
<td>***</td>
</tr>
<tr>
<td>0</td>
<td>6.67</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>10.00</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>13.33</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>16.67</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>20.00</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>23.33</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>26.67</td>
<td>***</td>
</tr>
<tr>
<td>7</td>
<td>30.00</td>
<td>**********</td>
</tr>
<tr>
<td>9</td>
<td>33.33</td>
<td>**********</td>
</tr>
<tr>
<td>28</td>
<td>36.67</td>
<td>*********************************************************</td>
</tr>
<tr>
<td>25</td>
<td>40.00</td>
<td>*********************************************************</td>
</tr>
<tr>
<td>34</td>
<td>43.33</td>
<td>*********************************************************</td>
</tr>
<tr>
<td>35</td>
<td>46.67</td>
<td>*********************************************************</td>
</tr>
<tr>
<td>20</td>
<td>50.00</td>
<td>*********************************************************</td>
</tr>
<tr>
<td>14</td>
<td>53.33</td>
<td>*********************************************************</td>
</tr>
<tr>
<td>19</td>
<td>56.67</td>
<td>*********************************************************</td>
</tr>
<tr>
<td>9</td>
<td>60.00</td>
<td>**********</td>
</tr>
<tr>
<td>9</td>
<td>63.33</td>
<td>*****</td>
</tr>
<tr>
<td>0</td>
<td>66.67</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>70.00</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Histogram Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>45.346</td>
</tr>
<tr>
<td>Mode</td>
<td>44.000</td>
</tr>
<tr>
<td>Kurtosis</td>
<td>2.572</td>
</tr>
<tr>
<td>Maximum</td>
<td>69.000</td>
</tr>
<tr>
<td>Std Err</td>
<td>.633</td>
</tr>
<tr>
<td>Std Dev</td>
<td>9.260</td>
</tr>
<tr>
<td>Range</td>
<td>65.000</td>
</tr>
<tr>
<td>Sum</td>
<td>9704.000</td>
</tr>
<tr>
<td>Median</td>
<td>44.500</td>
</tr>
<tr>
<td>Variance</td>
<td>85.739</td>
</tr>
<tr>
<td>Skewness</td>
<td>-.528</td>
</tr>
<tr>
<td>Minimum</td>
<td>4.000</td>
</tr>
</tbody>
</table>

Note. Total cases = 214.
Std Err = Standard Error; Std Dev = Standard Deviation.
Figure 8. Summary of Stanford Diagnostic grade equivalent scores for grade 7.

<table>
<thead>
<tr>
<th>Count</th>
<th>Midpoint</th>
<th>One Symbol Equals Approximately .40 Occurrences</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2.5</td>
<td>**</td>
</tr>
<tr>
<td>2</td>
<td>3.0</td>
<td>*****</td>
</tr>
<tr>
<td>2</td>
<td>3.5</td>
<td>*****</td>
</tr>
<tr>
<td>3</td>
<td>4.0</td>
<td>*********</td>
</tr>
<tr>
<td>6</td>
<td>4.5</td>
<td>*********  **</td>
</tr>
<tr>
<td>11</td>
<td>5.0</td>
<td>*********  *********</td>
</tr>
<tr>
<td>16</td>
<td>5.5</td>
<td>*********  *********  *********</td>
</tr>
<tr>
<td>9</td>
<td>6.0</td>
<td>*********</td>
</tr>
<tr>
<td>12</td>
<td>6.5</td>
<td>*********  ***</td>
</tr>
<tr>
<td>12</td>
<td>7.0</td>
<td>*********</td>
</tr>
<tr>
<td>10</td>
<td>7.5</td>
<td>*********</td>
</tr>
<tr>
<td>13</td>
<td>8.0</td>
<td>*********  **</td>
</tr>
<tr>
<td>5</td>
<td>8.5</td>
<td>*********</td>
</tr>
<tr>
<td>9</td>
<td>9.0</td>
<td>*********</td>
</tr>
<tr>
<td>6</td>
<td>9.5</td>
<td>*********</td>
</tr>
<tr>
<td>4</td>
<td>10.0</td>
<td>*********</td>
</tr>
<tr>
<td>8</td>
<td>10.5</td>
<td>*********  ****</td>
</tr>
<tr>
<td>0</td>
<td>11.0</td>
<td>********</td>
</tr>
<tr>
<td>6</td>
<td>11.5</td>
<td>********  *****</td>
</tr>
<tr>
<td>15</td>
<td>12.0+</td>
<td>********  *********</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Histogram Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 4 8 12 16 20</td>
</tr>
</tbody>
</table>

Mean 7.693  Std Err .198  Median 7.400
Mode 12.000  Std Dev 2.411  Variance 5.815
Kurtosis -.848  Range 9.000  Skewness .353
Maximum 12.000  Sum 1146.200  Minimum 3.000

Note. Total cases = 149.
Std Err = Standard Error; Std Dev = Standard Deviation.
C. Hypotheses and Results of Non-Standardized Measures

Six null hypotheses were stated in relation to the final posttest measures, four pertaining to treatment effects and two, addressing reading ability and gender effects. These will be considered separately for each grade.

1. Analysis of Data for Grade 5

The results for the grade 5 sample are shown in Tables 1 - 7. The data pertaining to hypotheses 1 to 4 can be found in Tables 1 and 2; results pertaining to hypothesis 5 can be found in Tables 3, 4 and 5, and data concerned with hypothesis 6 can be found in Tables 6 and 7.

H01: There will be no significant difference between the treatment groups on their adjusted mean posttest performance on an immediate multiple choice test measuring immediate levels of comprehension.

A significant difference, in favour of the experimental group, was found between treatment conditions on the Multiple choice measure of immediate comprehension and recall $F(1, 210) = 12.471, p < .001$. The null hypothesis was therefore rejected.

Thus, on the immediate multiple choice test, those students exposed to the structured lesson (experimental treatment) demonstrated significantly better comprehension of the information presented than those students exposed to the guided silent reading lesson (control treatment).
Table 1

Grade 5 Non-Standardized Test Means for Each Treatment Group

<table>
<thead>
<tr>
<th>Test</th>
<th>Condition</th>
<th>Mean</th>
<th>Std Dev</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>MCI</td>
<td>Experimental</td>
<td>7.380</td>
<td>1.609</td>
<td>105</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>6.587</td>
<td>1.665</td>
<td>109</td>
</tr>
<tr>
<td>SA1</td>
<td>Experimental</td>
<td>8.619</td>
<td>2.623</td>
<td>105</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>5.908</td>
<td>2.611</td>
<td>109</td>
</tr>
<tr>
<td>MC2</td>
<td>Experimental</td>
<td>6.666</td>
<td>1.807</td>
<td>105</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>5.917</td>
<td>1.676</td>
<td>109</td>
</tr>
<tr>
<td>SA2</td>
<td>Experimental</td>
<td>8.799</td>
<td>2.700</td>
<td>105</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>4.816</td>
<td>2.171</td>
<td>109</td>
</tr>
</tbody>
</table>

Note. Std Dev = Standard Deviation. MCI = Immediate Multiple Choice Test. SA1 = Immediate Short Answer Test. MC2 = Delayed Multiple Choice Test. SA2 = Delayed Short Answer Test.

Table 2

Summary of Treatment Effect Results for Grade 5

<table>
<thead>
<tr>
<th>Variable</th>
<th>F value</th>
<th>Significance of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>df = 1, 210</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MCI</td>
<td>12.4714</td>
<td>.001*</td>
</tr>
<tr>
<td>SA1</td>
<td>57.0918</td>
<td>.000**</td>
</tr>
<tr>
<td>MC2</td>
<td>9.8782</td>
<td>.002*</td>
</tr>
<tr>
<td>SA2</td>
<td>141.6994</td>
<td>.000**</td>
</tr>
</tbody>
</table>

Note. MCI = Immediate Multiple Choice Test. SA1 = Immediate Short Answer Test. MC2 = Delayed Multiple Choice Test. SA2 = Delayed Short Answer Test. *p < .005. **p < .001.
Table 3
Effect of Treatment on Reading Ability Levels - Grade 5

<table>
<thead>
<tr>
<th>Variable</th>
<th>F Value</th>
<th>Significance of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>df = 1, 208</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MCI</td>
<td>8.946</td>
<td>.003**</td>
</tr>
<tr>
<td>SA1</td>
<td>53.583</td>
<td>.000**</td>
</tr>
<tr>
<td>MCZ</td>
<td>5.949</td>
<td>.016*</td>
</tr>
<tr>
<td>SA2</td>
<td>139.867</td>
<td>.000**</td>
</tr>
</tbody>
</table>

Note. MCI = Immediate Multiple Choice Test. SA1 = Immediate Short Answer Test. MCZ = Delayed Multiple Choice Test. SAZ = Delayed Short Answer Test.
* $p < .05$. **$p < .005$. 
### Table 4

**Cell Means for Reading Ability Groups on Multiple Choice Tests - Grade 5**

<table>
<thead>
<tr>
<th>Rdg Grp</th>
<th>Condition</th>
<th>Mean</th>
<th>Std Dev</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Immediate Multiple Choice Test</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>Exp</td>
<td>6.968</td>
<td>1.731</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td>5.743</td>
<td>1.534</td>
<td>39</td>
</tr>
<tr>
<td>Mid</td>
<td>Exp</td>
<td>6.965</td>
<td>1.721</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td>6.809</td>
<td>1.656</td>
<td>42</td>
</tr>
<tr>
<td>High</td>
<td>Exp</td>
<td>7.954</td>
<td>1.275</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td>7.428</td>
<td>1.317</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td><strong>Delayed Multiple Choice Test</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>Exp</td>
<td>5.635</td>
<td>1.844</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td>5.153</td>
<td>1.442</td>
<td>39</td>
</tr>
<tr>
<td>Mid</td>
<td>Exp</td>
<td>6.655</td>
<td>1.343</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td>5.785</td>
<td>1.522</td>
<td>42</td>
</tr>
<tr>
<td>High</td>
<td>Exp</td>
<td>7.431</td>
<td>1.676</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td>7.178</td>
<td>1.492</td>
<td>28</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rdg Grp</th>
<th>Condition</th>
<th>Mean</th>
<th>Std Dev</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Immediate Multiple Choice Test</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>Exp</td>
<td>7.250</td>
<td>2.805</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td>4.307</td>
<td>2.141</td>
<td>39</td>
</tr>
<tr>
<td>Mid</td>
<td>Exp</td>
<td>8.310</td>
<td>2.479</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td>5.904</td>
<td>1.948</td>
<td>42</td>
</tr>
<tr>
<td>High</td>
<td>Exp</td>
<td>9.818</td>
<td>2.082</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td>8.142</td>
<td>2.548</td>
<td>28</td>
</tr>
<tr>
<td><strong>Delayed Multiple Choice Test</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>Exp</td>
<td>7.687</td>
<td>3.052</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td>3.794</td>
<td>1.975</td>
<td>39</td>
</tr>
<tr>
<td>Mid</td>
<td>Exp</td>
<td>8.206</td>
<td>2.127</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td>4.523</td>
<td>1.611</td>
<td>42</td>
</tr>
<tr>
<td>High</td>
<td>Exp</td>
<td>10.000</td>
<td>2.342</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td>6.869</td>
<td>2.037</td>
<td>28</td>
</tr>
</tbody>
</table>

Table 6  
Treatment Effect on Gender Performance - Grade 5

<table>
<thead>
<tr>
<th>Variable</th>
<th>F Value</th>
<th>Significance of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>df = 1, 210</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC1</td>
<td>.21898</td>
<td>.640</td>
</tr>
<tr>
<td>SA1</td>
<td>4.07321</td>
<td>.045*</td>
</tr>
<tr>
<td>MC2</td>
<td>.24533</td>
<td>.621</td>
</tr>
<tr>
<td>SA2</td>
<td>1.55852</td>
<td>.213</td>
</tr>
</tbody>
</table>

*Note. MC1 = Immediate Multiple Choice Test. SA1 = Immediate Short Answer Test. MC2 = Delayed Multiple Choice Test. SA2 = Delayed Short Answer Test. *p < .05.
Table 7

Cell Means for Treatment Condition by Gender - Grade 5

<table>
<thead>
<tr>
<th>Variable</th>
<th>Condition</th>
<th>Gender</th>
<th>Mean</th>
<th>Std Dev</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Males</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MCI</td>
<td>Exp</td>
<td></td>
<td>7.40</td>
<td>1.42</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Females</td>
<td>7.36</td>
<td>1.02</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td></td>
<td>6.70</td>
<td>1.64</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Females</td>
<td>6.45</td>
<td>1.70</td>
<td>49</td>
</tr>
<tr>
<td>SA1</td>
<td>Exp</td>
<td></td>
<td>8.24</td>
<td>2.78</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Females</td>
<td>9.04</td>
<td>2.45</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td></td>
<td>6.20</td>
<td>2.78</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Females</td>
<td>5.55</td>
<td>2.40</td>
<td>49</td>
</tr>
<tr>
<td>MCZ</td>
<td>Exp</td>
<td></td>
<td>6.67</td>
<td>1.72</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Females</td>
<td>6.66</td>
<td>1.90</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td></td>
<td>5.82</td>
<td>1.65</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Females</td>
<td>6.04</td>
<td>1.71</td>
<td>49</td>
</tr>
<tr>
<td>SA2</td>
<td>Exp</td>
<td></td>
<td>8.44</td>
<td>2.54</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Females</td>
<td>9.20</td>
<td>2.86</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td></td>
<td>4.85</td>
<td>2.24</td>
<td>60</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Females</td>
<td>4.78</td>
<td>2.10</td>
<td>49</td>
</tr>
</tbody>
</table>

Note. Std Dev = Standard Deviation. MCI = Immediate Multiple Choice Test. SA1 = Immediate Short Answer Test. MCZ = Delayed Multiple Choice Test. SA2 = Delayed Short Answer Test. Exp = Experimental Treatment. Cont = Control Treatment. Total cases for each test = 214.
Ho2: There will be no significant difference between the treatment groups on their adjusted mean posttest performance on a short answer recall test measuring immediate levels of comprehension.

A significant difference, in favour of the experimental group, was found between treatment conditions on the Short Answer measure of immediate comprehension and recall $F(1, 210) = 57.091, p < .000$. The null hypothesis was rejected.

In other words, those students exposed to the structured lesson significantly outperformed those exposed to the guided silent reading lesson on the immediate short answer test of reading comprehension; those students in the experimental group had a better understanding of the textual material, as measured by the short answer test, than those in the conventional or control group.

Ho3: There will be no significant difference between the treatment groups on their adjusted mean posttest performance on a delayed multiple choice test measuring delayed levels of comprehension.

A significant difference, in favour of the experimental group was found between treatment conditions on the Multiple Choice measure of delayed comprehension and recall $F(1, 210) = 9.878, p < .002$. The null hypothesis was rejected.

Once again, those students exposed to the experimental treatment significantly outperformed those exposed to the conventional treatment on the multiple choice test of delayed comprehension. The experimental
group appear to have better retained the information after a two week delay than the control group, although the difference between the control and the experimental groups is not as pronounced as on the immediate multiple choice test.

Ho4: There will be no significant difference between the treatment groups on their adjusted mean posttest performance on a delayed short answer recall test measuring delayed levels of comprehension.

A significant effect was found, favouring the experimental group, between treatment conditions on the Short Answer measure of delayed comprehension and recall ($F = 141.699$, df = 1/210, $p < .000$). The null hypothesis was rejected.

Thus, here too, on the short answer test of delayed comprehension the experimental group significantly outperformed the conventional group. The superior retention of the experimental group, over the control group, after a two week delay is demonstrated to an even greater degree on this delayed short answer test than on the immediate short answer test.

The following four hypotheses are considered together:

Ho5 (i): There will be no significant difference between treatment conditions (experimental, control) in the performance of the different reading ability groups (low, middle, high) as measured by adjusted mean posttest performance on the immediate multiple choice test.
Ho5 (ii): There will be no significant difference between treatment conditions (experimental, control) in the performance of the different reading ability groups (low, middle, high) as measured by adjusted mean posttest performance on the immediate short answer test.

Ho5 (iii): There will be no significant difference between treatment conditions (experimental, control) in the performance of the different reading ability groups (low, middle, high) as measured by adjusted mean posttest performance on the delayed multiple choice test.

Ho5 (iv): There will be no significant difference between treatment conditions (experimental, control) in the performance of the different reading ability groups (low, middle, high) as measured by adjusted mean posttest performance on the delayed short answer test.

With regard to all four of the above hypotheses, a significant interaction effect between treatment and reading ability, in favour of the experimental condition, was found for all three reading ability groups on all four measures of comprehension and recall:

Ho5 (i) immediate multiple choice $F(1, 208) = 8.946, p < .003,$

(ii) immediate short answer $F(1, 208) = 53.583, p < .000,$

(iii) delayed multiple choice $F(1, 208) = 5.949, p < .016,$

(iv) delayed short answer $F(1, 208) = 139.867, p < .000.$ The null hypotheses, in the four cases above, were therefore rejected (see Table 5).
Thus, as measured by all four tests, immediately after the lesson and after a two week delay, the low, middle, and high ability readers of the experimental group demonstrated significantly superior comprehension than the low, middle, and high ability readers of the control group. That is, the experimental treatment appears to have promoted the comprehension of all three ability levels of readers. Although no particular reading ability level was benefited more than another by the experimental treatment, by examining the means, some trends can be observed (see Tables 6 and 7). On all but the delayed multiple choice test, the low ability readers of the experimental condition appear to have benefited most. On the delayed multiple choice test the middle ability readers of the experimental condition appear to be helped most.

Ho6 (i): There will be no significant difference between treatment conditions (experimental, control) in the adjusted mean posttest performance of males and females on the immediate multiple choice test. There was no significant difference found between treatment conditions and performance of males and females on the immediate multiple choice test, F(1, 210) = .218, p > .640. Males and females performed similarly on this test, regardless of treatment. The null hypothesis was accepted.

Neither treatment (experimental or control) benefited one gender more than another, as measured by the immediate multiple choice test.
HoE (ii): There will be no significant difference between treatment conditions (experimental, control) in the adjusted mean posttest performance of male and females on the immediate short answer test.

There was a significant difference found between treatment conditions and the performance of males and females on the immediate short answer test: $F(1, 210) = 4.073$, $p < .045$. The females scored significantly higher than males in the experimental group; males, higher than females in the control group. The null hypothesis was rejected.

As evidenced by the immediate short answer test, females appear to have benefited more from the experimental treatment than males. The opposite appears to be the case for the conventional treatment, where males outperformed females on this measure of comprehension.

HoE (iii): There will be no significant difference between treatment conditions (experimental, control) in the adjusted mean posttest performance of males and females on the delayed multiple choice test.

There was no significant difference found between treatment conditions and the performance of males and females on the delayed multiple choice test: $F(1, 210) = .245$, $p > .621$. Males and females performed similarly on this test, regardless of treatment. The null hypothesis was therefore accepted.
After a two week delay, neither treatment (experimental or control) benefited one gender more than another, as evidenced by the results on the delayed multiple choice test.

H06 (iv): There will be no significant difference between treatment conditions (experimental, control) in the adjusted mean posttest performance of males and females on the delayed short answer test.

There was no significant difference found between treatment conditions and the performance of males and females on the delayed short answer test: $F(1, 210 = 1.558, p > .213$. Males and females performed similarly, regardless of treatment, on this test. The null hypothesis was therefore accepted.

After a two week delay, neither treatment (experimental or control) benefited one gender more than another, as evidenced by the results on the delayed short answer test. By examining the means, however, (see Table 9) the tendency that was seen in the immediate short answer test for the females of the experimental group to outperform males, can be seen although it is not significant in this case.
2. Analysis of Data for Grade 7

The results for the grade 7 sample are shown in Tables 8 to 14. Tables 8 and 9 show results related to hypotheses 1 to 4, Tables 10, 11 and 12 contain data related to hypothesis 5, and Tables 13 and 14 concern data related to hypothesis 6.

Hol: There will be no significant difference between the treatment groups on their adjusted mean posttest performance on an immediate multiple choice test measuring immediate levels of comprehension.

No significant difference was found between treatment groups on the immediate multiple choice measure of comprehension and recall \((F(1, 145) = .657, p > .419)\). The null hypothesis was accepted.

Treatment condition did not effect performance on the immediate multiple choice test.

Ho2: There will be no significant difference between the treatment groups on their adjusted mean posttest performance on a short answer recall test measuring immediate levels of comprehension.

No significant difference was found between treatment groups on the short answer measure of immediate comprehension and recall \((F(1, 145) = 2.762, p > .09)\). The null hypothesis was accepted.

The type of treatment did not significantly effect performance on the immediate short answer test, although in comparison to the immediate multiple choice test, there was a tendency for those students subjected to
Table 8
Grade 7 Non-Standardized Test Means for Each Treatment Group

<table>
<thead>
<tr>
<th>Test</th>
<th>Condition</th>
<th>Mean</th>
<th>Std Dev</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC1</td>
<td>Experimental</td>
<td>6.133</td>
<td>1.896</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>6.381</td>
<td>1.876</td>
<td>73</td>
</tr>
<tr>
<td>SA1</td>
<td>Experimental</td>
<td>25.457</td>
<td>4.913</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>24.207</td>
<td>4.322</td>
<td>73</td>
</tr>
<tr>
<td>MC2</td>
<td>Experimental</td>
<td>5.416</td>
<td>1.876</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>5.092</td>
<td>2.113</td>
<td>73</td>
</tr>
<tr>
<td>SA2</td>
<td>Experimental</td>
<td>8.799</td>
<td>4.927</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>Control</td>
<td>4.816</td>
<td>5.225</td>
<td>73</td>
</tr>
</tbody>
</table>

Note. Std Dev = Standard Deviation. MC1 = Immediate Multiple Choice Test. SA1 = Immediate Short Answer Test. MC2 = Delayed Multiple Choice Test. SA2 = Delayed Short Answer Test.

Table 9
Summary of Treatment Effect Results for Grade 7

<table>
<thead>
<tr>
<th>Variable</th>
<th>F value</th>
<th>Significance of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>df = 1, 145</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC1</td>
<td>.657</td>
<td>.419</td>
</tr>
<tr>
<td>SA1</td>
<td>2.762</td>
<td>.099</td>
</tr>
<tr>
<td>MC2</td>
<td>.836</td>
<td>.362</td>
</tr>
<tr>
<td>SA2</td>
<td>21.388</td>
<td>.000*</td>
</tr>
</tbody>
</table>

Note. MC1 = Immediate Multiple Choice Test. SA1 = Immediate Short Answer Test. MC2 = Delayed Multiple Choice Test. SA2 = Delayed Short Answer Test. *p < .001.
Table 10

Effect of Treatment on Reading Ability Levels - Grade 7

<table>
<thead>
<tr>
<th>Variable</th>
<th>F Value</th>
<th>Significance of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>df = 1. 208</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC1</td>
<td>.568</td>
<td>.452</td>
</tr>
<tr>
<td>SA1</td>
<td>3.571</td>
<td>.061</td>
</tr>
<tr>
<td>MC2</td>
<td>1.445</td>
<td>.231*</td>
</tr>
<tr>
<td>SA2</td>
<td>29.363</td>
<td>.000*</td>
</tr>
</tbody>
</table>

Note. MC1 = Immediate Multiple Choice Test. SA1 = Immediate Short Answer Test. MC2 = Delayed Multiple Choice Test. SA2 = Delayed Short Answer Test. * p < .01.
Table 11

*Call Means for Reading Ability Groups on Multiple Choice Tests - Grade 7*

<table>
<thead>
<tr>
<th>Rdg Grp</th>
<th>Condition</th>
<th>Mean</th>
<th>Std Dev</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Immediate Multiple Choice Test</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>Exp</td>
<td>5.000</td>
<td>1.742</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td>5.174</td>
<td>1.613</td>
<td>23</td>
</tr>
<tr>
<td>Mid</td>
<td>Exp</td>
<td>6.217</td>
<td>1.536</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td>6.333</td>
<td>1.732</td>
<td>27</td>
</tr>
<tr>
<td>High</td>
<td>Exp</td>
<td>7.280</td>
<td>1.646</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td>7.608</td>
<td>1.588</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td><strong>Delayed Multiple Choice Test</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>Exp</td>
<td>4.464</td>
<td>1.643</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td>3.565</td>
<td>1.375</td>
<td>23</td>
</tr>
<tr>
<td>Mid</td>
<td>Exp</td>
<td>5.391</td>
<td>1.725</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td>5.185</td>
<td>1.687</td>
<td>27</td>
</tr>
<tr>
<td>High</td>
<td>Exp</td>
<td>6.400</td>
<td>1.914</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td>6.478</td>
<td>2.212</td>
<td>23</td>
</tr>
</tbody>
</table>

## Table 12

**Cell Means for Reading Ability Groups on Short Answer Tests - Grade 7**

<table>
<thead>
<tr>
<th>Rdg Grp</th>
<th>Condition</th>
<th>Mean</th>
<th>Std Dev</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Immediate Multiple Choice Test</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>Exp</td>
<td>23.357</td>
<td>4.620</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td>22.000</td>
<td>3.931</td>
<td>23</td>
</tr>
<tr>
<td>Mid</td>
<td>Exp</td>
<td>25.043</td>
<td>4.587</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td>23.814</td>
<td>4.350</td>
<td>27</td>
</tr>
<tr>
<td>High</td>
<td>Exp</td>
<td>28.320</td>
<td>4.337</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td>26.956</td>
<td>3.336</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td><strong>Delayed Multiple Choice Test</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>Exp</td>
<td>19.428</td>
<td>4.902</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td>14.086</td>
<td>5.409</td>
<td>23</td>
</tr>
<tr>
<td>Mid</td>
<td>Exp</td>
<td>21.478</td>
<td>4.419</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td>17.407</td>
<td>3.703</td>
<td>27</td>
</tr>
<tr>
<td>High</td>
<td>Exp</td>
<td>24.400</td>
<td>4.262</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Cont</td>
<td>21.869</td>
<td>4.148</td>
<td>23</td>
</tr>
</tbody>
</table>

Table 13

Treatment Effect on Gender Performance - Grade 7

<table>
<thead>
<tr>
<th>Variable</th>
<th>F Value</th>
<th>Significance of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>df = 1, 145</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MC1</td>
<td>.09237</td>
<td>.762</td>
</tr>
<tr>
<td>SA1</td>
<td>.01466</td>
<td>.904</td>
</tr>
<tr>
<td>MCZ</td>
<td>.33715</td>
<td>.562</td>
</tr>
<tr>
<td>SA2</td>
<td>1.13047</td>
<td>.288</td>
</tr>
</tbody>
</table>

Note. MC1 = Immediate Multiple Choice Test. SA1 = Immediate Short Answer Test. MCZ = Delayed Multiple Choice Test. SA2 = Delayed Short Answer Test.
Table 14

Cell Means for Treatment Condition by Gender - Grade 7

<table>
<thead>
<tr>
<th>Variable</th>
<th>Condition</th>
<th>Gender</th>
<th>Mean</th>
<th>Std Dev</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exp</td>
<td>Males</td>
<td>6.31</td>
<td>1.92</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Females</td>
<td>5.95</td>
<td>1.87</td>
<td>41</td>
</tr>
<tr>
<td>MC1</td>
<td>Cont</td>
<td>Males</td>
<td>6.65</td>
<td>1.71</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Females</td>
<td>6.10</td>
<td>2.03</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>Exp</td>
<td>Males</td>
<td>24.91</td>
<td>4.71</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Females</td>
<td>26.00</td>
<td>5.10</td>
<td>41</td>
</tr>
<tr>
<td>SA1</td>
<td>Cont</td>
<td>Males</td>
<td>23.57</td>
<td>4.06</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Females</td>
<td>24.84</td>
<td>4.57</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>Exp</td>
<td>Males</td>
<td>5.85</td>
<td>1.80</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Females</td>
<td>4.97</td>
<td>1.94</td>
<td>41</td>
</tr>
<tr>
<td>MC2</td>
<td>Cont</td>
<td>Males</td>
<td>5.34</td>
<td>2.27</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Females</td>
<td>4.84</td>
<td>1.95</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>Exp</td>
<td>Males</td>
<td>21.60</td>
<td>4.44</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Females</td>
<td>21.75</td>
<td>5.40</td>
<td>41</td>
</tr>
<tr>
<td>SA2</td>
<td>Cont</td>
<td>Males</td>
<td>18.62</td>
<td>4.28</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Females</td>
<td>16.97</td>
<td>6.16</td>
<td>38</td>
</tr>
</tbody>
</table>

Note. Std Dev = Standard Deviation. MC1 = Immediate Multiple Choice Test. SA1 = Immediate Short Answer Test. MC2 = Delayed Multiple Choice Test. SA2 = Delayed Short Answer Test. Exp = Experimental Treatment. Cont = Control Treatment. Total cases for each test = 149.
the experimental treatment to perform better on this test than those subjected to the conventional or control treatment.

Ho3: There will be no significant difference between the treatment groups on their adjusted mean posttest performance on a delayed multiple choice test measuring delayed levels of comprehension.

No significant difference between treatment groups was found on the multiple choice measure of delayed comprehension and recall $F(1, 145) = 0.836, p > .362$. The null hypothesis was accepted.

After a two week delay, neither treatment significantly affected performance on the delayed multiple choice test. By examining the cell means (see Table 10) differences between treatment groups appears to be more pronounced on the delayed, rather than the immediate test measure.

Ho4: There will be no significant difference between the treatment groups on their adjusted mean posttest performance on a delayed short answer recall test measuring delayed levels of comprehension.

A significant difference was found between treatment groups, in favour of the experimental group, on the short answer recall measure of delayed comprehension and recall $F(1, 45) = 21.388, p < .000$. The null hypothesis was rejected.

After a two week delay, the trend towards improved performance for the experimental group that was seen on the immediate short answer test, becomes a significant difference on the delayed short answer test. On this test, the students exposed to the experimental treatment outperformed those exposed to the conventional treatment.
Ho5 (i): There will be no significant difference between treatment conditions (experimental, control) in the performance of the different reading ability groups (low, middle, high) as measured by adjusted mean posttest performance on the immediate multiple choice test.

There was no significant difference found between treatment condition and the performance of reading ability groups on the immediate multiple choice test: $F(1, 143) = .568, p > .452$. The null hypothesis was accepted.

Neither treatment affected the performance of different reading ability groups. As well, no particular reading group performed better than another with either treatment.

Ho5 (ii): There will be no significant difference between treatment conditions (experimental, control) in the performance of the different reading ability groups (low, middle, high) as measured by adjusted mean posttest performance on the immediate short answer test.

There was no significant difference found between treatment condition and the performance of reading ability groups on the immediate short answer test: $F(1, 143) = 3.571, p > .061$. The null hypothesis was accepted.

Although neither treatment significantly affected the performance of different reading groups on this test, there was a trend, in favour of the experimental condition, towards the superior performance of all three
reading groups (see Table 14 describing cell means). However, no trend
towards a particular reading group being benifited more than another by
the experimental treatment was revealed. All three reading groups were
equally benifited, regardless of treatment.

Ho5 (iii): There will be no significant difference between treatment
conditions (experimental, control) in the performance of the
different reading ability groups (low, middle, high) as
measured by adjusted mean posttest performance on the delayed
multiple choice test.

There was no significant difference found between treatment
condition and the performance of different reading ability groups on the
delayed multiple choice test: $F(1, 143) = 1.445, p > .231$. The null
hypothesis was accepted.

After a two week delay, the treatment condition still did not
affect the performance of different reading groups on this test. Neither
did one particular reading group perform better than another with either
treatment condition.

Ho5 (iv): There will be no significant difference between treatment
conditions (experimental, control) in the performance of the
different reading ability groups (low, middle, high) as
measured by adjusted mean posttest performance on the delayed
short answer test.

A significant difference was found between treatment and reading
ability on the delayed short answer test: $F(1, 143) = 29.364, p < .000$. 
While no particular reading ability group benefited from the experimental treatment, all three reading ability groups were significantly benefited by this treatment as displayed by their performance on the delayed short answer test. The null hypothesis was therefore rejected.

After a two week delay, the trend that was seen on the immediate short answer test towards the superior performance of reading ability groups from the experimental condition, becomes a significant difference on this test. The reading comprehension of all three reading ability groups was helped by the experimental treatment. No particular reading group, however, was benefited more than another.

Ho6 (i): There will be no significant difference between treatment conditions (experimental, control) in the adjusted mean posttest performance of males and females on the immediate multiple choice test.

There was no significant difference found between treatment conditions and performance of males and females on the immediate multiple choice test, \( F(1, 145) = .092, p > .762 \). Males and females performed similarly on this test, regardless of treatment. The null hypothesis was accepted.

Neither treatment (experimental or control) benefited one gender more than another, as measured by the immediate multiple choice test.

Ho6 (ii): There will be no significant difference between treatment conditions (experimental, control in the adjusted mean posttest performance of male and females on the immediate short answer test.
There was no significant difference found between treatment conditions and the performance of males and females on the immediate short answer test: $F(1, 145) = .014, p < .904$. Males and females performed similarly on this test, regardless of treatment. The null hypothesis was accepted.

Neither treatment (experimental or control) benefited one gender more than another, as measured by the immediate short answer test.

Ho6 (iii): There will be no significant difference between treatment conditions (experimental, control) in the adjusted mean posttest performance of males and females on the delayed multiple choice test.

There was no significant difference found between treatment conditions and the performance of males and females on the delayed multiple choice test: $F(1, 145) = .337, p > .562$. Males and females performed similarly on this test, regardless of treatment. The null hypothesis was therefore accepted.

After a two week delay, neither treatment (experimental or control) benefited one gender more than another, as evidenced by the results on the delayed multiple choice test.

Ho6 (iv): There will be no significant difference between treatment conditions (experimental, control) in the adjusted mean posttest performance of males and females on the delayed short answer test.

There was no significant difference found between treatment
conditions and the performance of males and females on the delayed short answer test: $F(1, 145 = 1.138, p > .288$. Males and females performed similarly, regardless of treatment, on this test. The null hypothesis was therefore accepted.

After a two week delay, neither treatment (experimental or control) benefited one gender more than another, as evidenced by the results on the delayed short answer test.

The results for the grade 7 sample are summarized in Tables 10 - 16.

This chapter presented the results of the study in three sections: 1) the results of the standardized test measures used, 2) the scoring reliability, and 3) the hypotheses, in conjunction with the results of the non-standardized test measures used.

Chapter 5 will discuss the results of the data analysis presented in this chapter.
CHAPTER V: Summary, Limitations, Conclusions, Implications

In this chapter a summary of the study, its limitations, the conclusions, and implications will be presented. The summary will review the purpose, the rationale, and the methodology of the study. A discussion of the results will also be included. The limitations will deal with the extent to which the results may be generalized. Conclusions will be outlined separately for the two grade levels: grade 5 and grade 7. Finally, the implications will address the practical application of the findings, and suggest areas for future research.

A. Summary

1. Purpose

The purpose of this study was to determine whether students who are required to process the pictures in their Social Studies textbooks, in a structured manner, would achieve better comprehension and recall of the accompanying connected prose than those who pay only incidental attention to the pictures. Also examined was whether such instruction is best directed at a particular reading group or gender.

2. Rationale

The rationale for using a visually structured approach was based on research which suggests that pictures carry instructional potential that
could be enhanced through the practice of a number of principles. These principles include the use of: concrete stimuli prior to abstract material, pictures to activate existing schema, pictures as devices for relating text information, and pictures as review frameworks for stimulating recall. To determine the facilitative effects of using a visually structured lesson, four questions were asked: 1) & 2) Would grade 5 and grade 7 students exposed to a visually structured lesson, demonstrate superior comprehension and recall of a passage from their prescribed Social Studies textbook over students receiving text processing instruction only, on immediate and delayed measures? 3) Would there be an interaction between treatment condition and reading ability levels as observed on measures of both immediate and delayed comprehension and recall? 4) Would the gender of grade 5 and 7 students affect performance, with or without the visually structured lesson, on measures of both immediate and delayed comprehension and recall?

3. Method

Data were collected from eight classes of grade 5 students attending four public elementary schools, and from six classes of grade 7 students attending 3 public elementary schools, all in the Vancouver School District. A pretest-posttest non-equivalent control group design was used to test six hypotheses for each grade. The control groups received text processing instruction only, while the experimental groups received integrated picture/text instruction. Data on immediate and delayed measures of comprehension and recall were analyzed using analysis of covariance, with Gates-MacGinitie and Stanford Diagnostic scores functioning as covariates for each grade.
4. Discussion of Results

a) Grade 5

For the grade 5 sample, results indicated comprehension and recall of text content were significantly enhanced for those in the experimental group; this significant effect was observed on all four measures of immediate and delayed comprehension and recall. The more pronounced facilitative effect of pictures on comprehension in delayed recall has been observed by many authors (Duchastel, 1980; Levie & Lentz, 1972; Peeck, 1974; Rusted & Coltheart, 1979; and Haring & Fry, 1979). Although the grade 5 results reveal such a tendency was not apparent on the multiple choice tests, the results on the short answer tests support this concept. That is, the experimental (pictorial) treatment significantly facilitated comprehension on the immediate short answer test, but the most significant effects of the visually structured treatment were seen after a delay of two weeks, on the delayed short answer test. For the short answer tests, at any rate, the benefits of the visually structured lesson were most apparent in delayed recall.

While no reading group (low, average, or high) benefited more than another as a result of treatment, all three reading groups exposed to the experimental treatment outperformed the three reading groups of the control group. A slight trend, not significant, was observed, however; the low ability readers appeared to be most helped by the experimental treatment. Support for idea that poorer readers may benefit more from pictorially related instruction has been noted in a number of studies (Donald, 1983; Haring & Fry, 1979; and Rusted & Coltheart, 1979).

Finally, one significant interaction effect was found between
gender and treatment: females in the experimental group outperformed males on one measure of comprehension and recall, the immediate short answer test. The superior performance of females over males in the experimental group on this test measure lends support to the assertion by Ernest (1968) that high imagery ability is related to learning with females but not with males. Paivio (1971), too, has suggested that females use imaginal processes to facilitate recall whereas males do not. Finally, Rusted and Coltheart (1979) found that at age 9 (a similar age to the grade 5 sample of this study) females outperformed males on paired associate tasks with pictures. That there was no difference between males and females on the delayed measure may be related to Brownfield's (1965) finding that males have longer after-images.

b) Grade 7

For the grade 7 sample, results indicate while treatment made no significant difference to the comprehension and recall of text on three measures (immediate multiple choice, delayed multiple choice, immediate short answer), on one delayed measure, the short answer test, the experimental group outperformed the control. This result provides further evidence for the idea that delayed recall is enhanced more than immediate recall in picture related instruction (Haring & Fry, 1979; Rusted & Coltheart, 1979; Duchastel, 1980; Peeck, 1974).

It was found that no particular reading ability group's comprehension was significantly enhanced more than another, on any of the four test measures. Instead, on the delayed short answer test, it was found that all three reading ability groups (low, middle, and high) in the
experimental group significantly benefited from the treatment. Wardle (1977) and Donald (1983), in their picture-related research, were able to detect a significant difference between recall performance of different reading ability levels, favouring the poorer readers in picture conditions. Differences between the performance of different reading ability groups are reported rarely, however (Levie, & Lentz, 1972), so that such a result, here, is not unexpected.

Finally, no significant interaction effects were found between condition and gender. Although females were seen to outperform males under the experimental condition on the grade 5 delayed short answer test, no such differences were found in the grade 7 sample. This result is not surprising, however, since the research concerned with gender differences presents an unresolved picture. Maccoby and Jacklin (1971), for example, conclude that no sex is more "visual" than another.

c) Both samples

A statistical comparison between grades was not possible due to the varied nature of the testing instruments, and the instructional materials; some comments may be in order, however. The experimental treatment appeared to be more effective with the grade 5 students than with the grade 7 students. This result might have several explanations.

First, the grade 7 expository material was relatively easier to read than the grade 5 textual material. This may have allowed both treatment groups in the grade 7 sample extra time to study the pictures, and, or the text, thus diluting the effect of the visually structured
Secondly, because the readability of the grade 7 test made the prose relatively easier to comprehend than in the grade 5 case, the grade 7 text may not have been dependent upon the illustrations to the same degree as the grade 5 text passages. Hayes and Readence (1983) demonstrated that comprehension is affected by the degree of text dependency on illustrations. If the illustrations in the grade 7 text were not as important to the understanding of the connected prose as in the case of the grade 5 text, the grade 7 students' comprehension and recall performance may have been affected.

Third, the illustrations contained in the grade 7 text may have been less complex, and less realistic, on the whole, than those contained in the grade 5 text. Since it has been postulated that complex, realistic pictures receive more attention than simple representations, (Mackworth, & Morandi, 1967) and particularly in the case of medium to high prior-knowledge students (Joseph, & Dwyer, 1984), the grade 7 students may not have attended to the illustrations to the same degree as the grade 5 sample.

Another side to this issue, is suggested by Tversky's research (1974) which revealed that the fewer the number of eye fixations given to simple line drawings, the higher the resulting recall. The grade 7 text booklets contained two simple line drawings; if the conventional group gave less attention to them perhaps their recall performance was affected favourably compared to the experimental group.

Finally, it has also been suggested that the ability to make use of pictures is developmental. Snodgrass, Volvovitz, and Walfish (1972)
suggest that with high school students, two stimuli (pictures and words) are not better than pictures alone, since, by this age students automatically engage in the dual coding of pictures. Perhaps this trend is reflected here, with the older, seventh grade students appearing not to benefit from the visually structured lesson to the same degree as the younger, fifth grade students. Perhaps related to this, too, may be the findings of Anderson and Kulhavy (1972) that imagery instructions facilitate prose learning to a lesser extent with high school students, than with younger grade levels.

B. Limitations

The following limitations should be noted when interpreting the results of this study.

Generalizability of the results is limited to the type of materials used in the study, the grade levels of students who participated, and the type of measurements used to assess immediate and delayed comprehension and recall. The materials used were text passages from prescribed Social Studies textbooks. The students who participated were fifth and seventh graders representing a wide range of reading levels, and cultural backgrounds. Comprehension and recall of text was measured by multiple choice and short answer tests, used as both immediate and delayed instruments.

A limitation in random sampling took place in the selection of students. It was necessary to use intact classes from schools willing to participate in the study. An attempt to control the socioeconomic
variable, however, was made in having one class in each school function as part of the experimental group, and one class as part of the control.

Teacher involvement in the study limited the control of instruction given to students. All eight classes of the grade 5 sample and all six classes of the grade 7 sample had a different teacher. Thus, although standardized lesson outlines were provided, none of the classes would have had identical instruction. The presentation of instructions could not be controlled.

One limitation is noted in the tests used in this study. The short answer and multiple choice tests, although found to have acceptable levels reliability, could have been further refined through item analysis and repeated trials in order to improve their levels of reliability.

Finally, one other limitation pertains to the role of students' existing schema. Although the text passages used in this study were not seen by the students beforehand, the student's levels of existing background knowledge were not taken into account as a possible variable influencing comprehension and recall.

C. Conclusions

1. Grade 5

Based on the findings from the fifth grade sample, the first conclusion that can be drawn is that a visually structured lesson appears to facilitate the comprehension and recall of text content as measured by multiple choice and short answer tests. Students exposed to instruction
which sought to integrate visual and verbal content in a structured manner scored higher on multiple choice and short answer tests. Performance was not only facilitated on immediate tests, but also on delayed measures two weeks after the lesson.

Another conclusion drawn from the findings is that low, average, and high ability readers appear to benefit equally from the use of the visually structured lesson. No single reading ability group is helped by such an approach more than another. All three reading ability groups exposed to the visually structured lesson scored higher on all four measures of comprehension and recall.

The final conclusion that the findings of the study suggest is that, on some measures, females may score higher than males with the use of the visually structured lesson. Females exposed to the experimental condition outperformed males on the short answer test measuring immediate comprehension and recall.

2. Grade 7

Based on the findings from the seventh grade sample, one conclusion that may be drawn is that the visually structured lesson approach does not appear to facilitate immediate comprehension and recall, or delayed comprehension and recall as measured by a delayed multiple choice test, but it does appear to facilitate delayed comprehension and recall, when this is measured by a short answer test. Subjects in the experimental group scored higher than the control on the delayed short answer test.

One other conclusion that can be drawn from the findings is that low, average, and high ability readers can benefit equally from the experimental treatment as measured by the delayed short answer test, but
there appears to be no difference, regardless of treatment, in the way
low, middle, and high ability readers perform on other test measures
(immediate multiple choice and short answer, delayed multiple choice
tests).

The final conclusion drawn is that neither males nor females perform
better when exposed to either the experimental or control treatment.

D. Implications

Based on the conclusions and limitations of the study, several
implications are suggested. The implications are divided into implications
for the classroom teacher and suggestions for further research.

1. Implications for the Classroom Teacher

Teachers could devise visually structured lessons for sections of
their science and social studies textbooks so that students would focus
more carefully on the pictures and their relationship to the text. Once a
teacher has identified a section and studied the illustrations, questions
could be devised to 1) activate existing schema, 2) integrate picture/text
content, and 3) provide and opportunity for rehearsal and review. If
students were to become familiar with this technique, as a next step, the
teacher could explain the question purposes to the students, and the
students could learn to develop their own questions as a type of study
guide for illustrated content area textbooks.

Training in how to make use of illustrations may benefit
comprehension and recall, and particularly delayed recall for older
students, in all content area subjects where illustrations appear.
2. Suggestions for Further Research

Based on the conclusions and the limitations for the study several implications for further research are suggested.

Further research should be conducted to determine at what age level students could effectively make use of a visually structured lesson, and at what age the use of this approach would be ineffectual. Longitudinal studies comparing several strategies could be constructed.

The maximum delay of recall has not been determined. Studies investigating how long students are able to retain information as a result of different treatment conditions could be conducted.

The relationship between the readability level of connected prose and the potential of accompanying pictures to enhance comprehension has not been fully explored. Studies comparing different levels of text readability accompanied by the same pictures could be undertaken.

Another factor which has not been fully assessed in picture related research is the effect of picture complexity or type of visual on text comprehension in combination with a visually structured lesson. Although Duyer (1973) has conducted a number of studies in the area of different forms of illustration and the effect of their presence, no attempt has been made to explore the effects of different types of visuals when instruction is included.

Although fifth grade females outperformed males on one measure of immediate comprehension and recall, this difference did not appear on any of the delayed measures. The findings for the immediate test are in
keeping with Ernest & Paivio's (1971) suggestion that in some cases females may 'use' imaginal processes to facilitate recall, but the females inability to maintain this lead on the delayed test measure is perhaps related to Brownfield's (1955) findings that adult males have longer after-images. More research needs to be conducted to explore why and under what conditions these gender differences occur.

This study did not employ the use of writing to any great extent in the lesson. Further studies could be conducted to compare the effects of using different combinations of response procedures on levels of comprehension and recall.


Appendix A

Vancouver School Board Permission Letter
Appendix B

University of British Columbia Ethics Committee

Approval Certificate
Appendix C

Lesson Procedure Instructions for Each Grade and Each Treatment Condition
Grade 5 Lesson Procedure Instructions

for the Experimental Treatment
GENERAL INSTRUCTIONS TO TEACHERS

Please read these preliminary instructions before you conduct the lesson.

1. As you read the questions and instructions in this handbook to your class try not to alter your normal teaching style. If you wish, you may give positive reinforcement, and repeat answers for clarity.

2. If any question does not elicit the desired response, briefly explain the correct answer to the class yourself. (The desired answer will appear in the outline).

3. Timing is important. Please adhere to the 30 minutes allowed for the lesson.

4. It is important to keep the lesson moving at a reasonable pace, or students may not have adequate time to read the text. 5. A brief plan of the lesson you will follow is outlined, here, as an overview.

5. A brief plan of the lesson you will follow is outlined, here, as an overview.

Hand out materials. (Social Studies booklets, paper)

PICTURE/ Begin timing.

TEXT Conduct the Guided Reading of the text.

PROCESSING In time remaining, students reread text to themselves.
After 30 minutes, booklets and papers collected.
Hand out first test, and conduct according to TESTING instructions. These tests are collected, after time allocated has elapsed. Hand out second test, and conduct according to instructions. These tests are collected after allocated time has elapsed.

PROCEDURE:

Step 1: Each student should have a Social Studies booklet, and a piece of lined paper. Have these materials handed out.

Step 2: As they are being handed out, say: THESE ARE SOME SOCIAL STUDIES BOOKLETS THAT WE ARE GOING TO READ.

Step 3: When everyone has a booklet and a piece of lined paper, say: PLEASE LOOK AT PAGE 347 IN YOUR BOOKLET.

Step 4: At this point make a note of the STARTING TIME. (Total exposure time to the materials should be exactly 30 minutes from this point onwards).

Step 5: Proceed with the picture discussion of page 347. You may repeat students' answers for clarity and give positive reinforcement for correct responses. Do not change your usual teaching style, however. Where the question does not appear to elicit the desired response, you may give and/or explain the correct answer. Try to ensure that the correct answer has been heard by the whole class before moving on to the next question.
Teacher says:

LOOK AT THE PICTURE ON PAGE 347.
DO YOU THINK THIS IS A PAINTING OR A PHOTOGRAPH?

WHY DO YOU THINK IT'S A PAINTING?

WHAT IS HAPPENING IN THE PICTURE?

CAN YOU GUESS WHAT THEY ARE BUILDING?

READ THE WORDS UNDER THE PICTURE TO SEE IF YOU CAN FIND OUT WHO THE SCHOOL IS FOR. WHO IS IT FOR?

WHAT ARE IMMIGRANTS?

WHO IS BUILDING THE SCHOOL?

READ PAGE 346 TO SEE IF YOU CAN FIND OUT HOW THE UKRAINIANS FELT ABOUT HAVING A SCHOOL. IF YOU FINISH BEFORE OTHER PEOPLE, READ THE PAGE AGAIN BECAUSE YOU WILL BE ASKED SOME QUESTIONS ABOUT IT LATER.

(Allow enough time for most of the class to read this page, and then say,)

STOP READING NOW. HOW DID THE UKRAINIANS FEEL ABOUT HAVING THE SCHOOL BUILT?

CAN YOU SEE IN THE PICTURE WHERE THE TEACHER WOULD LIVE?

WHY NOT? WHERE DID THE TEACHER LIVE?

COULD THERE BE ANY TRUSTEES IN THE PICTURE?

WHY?
Teacher says:

NOW TURN THE PAGE, AND LOOK AT THE PICTURE AT THE BOTTOM OF PAGE 348. IS THIS A PAINTING OR A PHOTOGRAPH?

WHY IS IT BLACK AND WHITE?

GOOD!

COULD THIS BE A PHOTOGRAPH OF YOUR CLASS AT SCHOOL TODAY?

LET'S SEE IF YOU ARE A GOOD DETECTIVE, THEN. ON YOUR PIECE OF PAPER, WRITE DOWN AS MANY CLUES AS YOU CAN FIND IN THIS PICTURE THAT IT IS A LONG TIME AGO. SEE IF YOU CAN FIND 12.

(Give students a minute or two to work on this, and then say,)

STOP NOW AND CHECK TO SEE IF YOU WROTE DOWN ANY OF THESE:

Then read the correct answers as listed ---)

HOW DID YOU DO? DID ANYONE FIND 12? 11? 10?

GOOD!

READ PAGE 348 NOW TO SEE WHAT IT WAS LIKE FOR THREE UKRAINIAN CHILDREN WHO WENT TO SCHOOL. THEIR NAMES ARE WASYL, PETRO, AND MARIA. IF YOU FINISH READING BEFORE OTHERS, READ THE PAGE AGAIN BECAUSE IT IS IMPORTANT TO REMEMBER IT.

STOP READING NOW AND LOOK AT THE SAME PICTURE AT THE BOTTOM OF PAGE 348 AGAIN. IF YOU WERE PETRO OR MARIA IN THIS CLASS, HOW WOULD YOU FEEL?

WHY WOULD YOU FEEL THIS WAY?

IF YOU WERE WASYL IN THIS CLASS, WOULD YOU FEEL BETTER? WHY?

Expected student response:

a photograph

colour photography had not been invented yet

Correct Answers:

1. vests
2. suspenders
3. ties
4. flag - Union Jack
5. pinafores
6. hairdos
7. lace-up boots
8. one teacher/many grades
9. wooden building, windows
10. boys and girls standing separately
11. teacher's double-breasted jacket
12. teacher's old-fashioned glasses

(When most children have had time to read this page resume the discussion)

lonely, shy, bewildered

because in Petro and Maria's class, they were the only two children who could not speak English

yes - because none of the students could speak English in his class: they were all Ukrainian
Teacher says:

LOOK AT THE PICTURE AT THE TOP OF
THIS PAGE NOW. (page 349)
IS THIS A PAINTING OR A PHOTOGRAPH?

WHY?

WHY ELSE?

WHAT DO YOU THINK IS HAPPENING IN
THIS PICTURE?

READ THIS PAGE TO SEE IF YOU ARE RIGHT.
IF YOU HAVE EXTRA TIME, READ THE PAGE
AGAIN. (Allow enough time for most
children to read the page, and then say,)
STOP READING NOW, AND TELL ME WERE YOU
RIGHT? WHAT DO YOU THINK IS HAPPENING
IN THE PICTURE?

CAN YOU ANSER THE QUESTION UNDER THE
PICTURE? (Teacher reads it) "IF YOU
WERE A UKRAINIAN PARENT IN CANADA WHICH
LANGUAGE WOULD YOU MOST WANT YOUR
CHILDREN TO LEARN TO READ AND WRITE --
ENGLISH OR UKRAINIAN? WHY?"

Expected student response:

painting

not real enough

no colour photos at this
time

(accept any reasonable
responses)

Mother teaching her son the
English alphabet

English, because it is the
language that most people
speak in Canada.
Teacher says:

NOW TURN TO THE LAST PAGE AND LOOK AT THIS PICTURE. IS IT A PHOTOGRAPH OR A PAINTING?

WHY ISN'T IT IN COLOUR?

WHAT DOES THE PICTURE SHOW?

READ THE WORDS UNDER THE PICTURE TO HELP YOU DECIDE IF THIS IS A CLASS LIKE MARIA AND PETRO'S, OR A CLASS LIKE WASYL'S. WHICH IS IT?

WHY DO YOU SAY IT'S A CLASS LIKE WASYL'S?

READ THIS PAGE NOW TO FIND OUT WHEN THESE CHILDREN WENT TO SCHOOL. (Allow enough time for most of the class to read the page.)

WHEN DID THESE CHILDREN GO TO SCHOOL?

WHY? WHY DID THEY GO IN WINTER?

THESE STUDENTS DO NOT LOOK VERY HAPPY. GOING TO SCHOOL WAS DIFFICULT FOR THEM. WHAT WERE SOME OF THE PROBLEMS THEY HAD THAT EVA WROTE ABOUT?

GOOD. WELL DONE.

If time remains out of the 30 minutes allowed, say to the class:

I WILL GIVE YOU ANOTHER ______ MINUTES TO READ OVER THESE PAGES AND STUDY THE PICTURES. AFTER THAT YOU WILL BE ASKED TO ANSWER SOME QUESTIONS.

When the 30 minutes have elapsed, say: STOP READING NOW PLEASE. Then have all the booklets collected.

Proceed to TESTING.
Grade 5 Lesson Procedure Instructions

for the Conventional Treatment
GENERAL INSTRUCTIONS TO TEACHERS

Please read these preliminary instructions before you conduct the lesson.

1. As you read the questions and instructions in this handbook to your class try not to alter your normal teaching style. If you wish, you may give positive reinforcement, and repeat answers for clarity.

2. If any question does not elicit the desired response, briefly explain the correct answer to the class yourself. (The desired answer will appear in the outline).

3. Timing is important. Please adhere to the 30 minutes allowed for the lesson.

4. It is important to keep the lesson moving at a reasonable pace, or students may not have adequate time to read the text. 5. A brief plan of the lesson you will follow is outlined, here, as an overview.

5. A brief plan of the lesson you will follow is outlined, here, as an overview.

Hand out materials. (Social Studies booklets, paper)

BEGIN TIMING

Begin timing.

Conduct the Guided Reading of the text.

In time remaining, students reread text to themselves.

After 30 minutes, booklets and papers collected.
Hand out first test, and conduct according to
TESTING instructions. These tests are collected, after time
allocated has elapsed. Hand out second test, and conduct
according to instructions. These tests are collected
after allocated time has elapsed.

PROCEDURE:

Step 1: Each student should have a Social Studies booklet, and a piece of
lined paper. Have these materials handed out.

Step 2: As they are being handed out, say: THESE ARE SOME SOCIAL STUDIES
BOOKLETS THAT WE ARE GOING TO READ.

Step 3: When everyone has a booklet and a piece of lined paper, say:
PLEASE LOOK AT PAGE 346 IN YOUR BOOKLET.

Step 4: At this point make a note of the STARTING TIME. (Total exposure
time to the materials should be exactly 30 minutes from this point
onwards).

Step 5: Proceed with the Guided Reading of page 346. You may repeat
students' answers for clarity and give positive reinforcement for
correct responses. Do not change your usual teaching style,
however. Where the question does not appear to elicit the desired
response, you may give and/or explain the correct answer. Try to
ensure that the correct answer has been heard by the whole class
before moving on to the next question.
Teacher says:

THIS BOOKLET IS ABOUT THE CHILDREN OF UKRAINIAN IMMIGRANTS AND WHAT HAPPENED TO THEM AT SCHOOL.

WHAT ARE "IMMIGRANTS"?

READ JUST THIS FIRST PAGE, PAGE 34G, TO SEE IF YOU CAN FIND OUT HOW THE UKRAINIANS FELT ABOUT HAVING A SCHOOL. IF YOU FINISH BEFORE OTHER PEOPLE, READ THE PAGE AGAIN BECAUSE YOU WILL BE ASKED SOME QUESTIONS ABOUT IT LATER.

(Allow enough time for most of the class to read this page, and then say,)

STOP READING NOW. HOW DID THE UKRAINIANS FEEL ABOUT HAVING A SCHOOL BUILT?

WHERE DID THE TEACHER LIVE?

DO YOU REMEMBER WHOSE FATHER WAS A SCHOOL TRUSTEE?

Expected student response:

People from another country who come to a new country to live.

Everyone wanted a school, when they heard they would be fined if they didn't send their children to school.

The teacher took turns living in different students' homes.

Wasyl's
Teacher says:

NOW TURN TO PAGE 348.
WHAT DO YOU THINK THIS PAGE WILL BE ABOUT?

READ THIS PAGE NOW, PAGE 348 ONLY, TO SEE IF YOU ARE RIGHT. IF YOU FINISH BEFORE OTHERS, READ THE PAGE AGAIN BECAUSE IT IS IMPORTANT TO REMEMBER IT.
(When most children have had time to read this page once, resume the discussion)

STOP READING NOW.
CAN YOU TELL ME THE FIRST NAMES OF THREE UKRAINIAN CHILDREN THAT YOU READ ABOUT?
GOOD!

HOW WOULD YOU FEEL AT SCHOOL IF YOU WERE PETRO OR MARIA?

WHY WOULD YOU FEEL THIS WAY?

WOULD YOU FEEL BETTER IF YOU WERE WASYL AT SCHOOL? WHY?

ON YOUR PIECE OF PAPER SEE IF YOU CAN WRITE DOWN THE ANSWERS TO THESE QUESTIONS:
1. HOW OLD WAS WASYL WHEN HE STARTED SCHOOL?
2. HOW OLD WAS PETRO WHEN HE FIRST WENT TO SCHOOL?
3. HOW OLD WAS MARIA?
4. CAN YOU REMEMBER THE UKRAINIAN WORD FOR HORSE?
5. WHAT WAS THE NAME OF THE GAME THE CHILDREN WERE PLAYING OUTSIDE AT PETRO'S SCHOOL?

MARK YOUR OWN. I WILL READ YOU THE ANSWERS.
1. WASYL WAS 10
2. PETRO WAS 11
3. MARIA WAS 8
4. THE WORD FOR HORSE IS KIN (keen)
5. THE GAME THEY PLAYED WAS "ANTE ANTE OVER".

HOW DID YOU DO? DID ANYONE GET ALL 5 CORRECT? 4? WELL DONE!
Teacher says:

READ THE FIRST LINE ON PAGE 349. WHAT DO YOU THINK THIS PAGE WILL BE ABOUT?

READ THIS PAGE TO SEE IF YOU ARE RIGHT. IF YOU HAVE EXTRA TIME, READ THE PAGE AGAIN. (Allow enough time for most children to read the page, and then say,) STOP READING NOW, AND TELL ME WERE YOU RIGHT? WHAT WAS THIS PAGE ABOUT?

HOW DID PETRO'S PARENTS HELP HIM TO READ ENGLISH?

IF YOU WERE A UKRAINIAN PARENT IN CANADA WHICH LANGUAGE WOULD YOU MOST WANT YOUR CHILDREN TO LEARN TO READ AND WRITE -- ENGLISH OR UKRAINIAN ?

WHY?

Expected student response:

about how Petro learned to read

English

it was about how Petro learned to read English

they taught him the letters of the English alphabet

English

because it is the language that most people speak in Canada.
Teacher says:

NOW TURN TO THE LAST PAGE.

READ THIS PAGE NOW TO FIND OUT WHEN UKRAINIAN CHILDREN WENT TO SCHOOL. (Allow enough time for most of the class to read the page).

WHEN DID UKRAINIAN CHILDREN GO TO SCHOOL?

WHY? WHY DID THEY GO IN WINTER?

GOING TO SCHOOL WAS DIFFICULT FOR UKRAINIAN CHILDREN. WHAT WERE SOME OF THE PROBLEMS THEY HAD THAT EVA WROTE ABOUT?

GOOD. WELL DONE!

If time remains out of the 30 minutes allowed, say to the class:

I WILL GIVE YOU ANOTHER ___ MINUTES TO READ AND STUDY THESE PAGES AGAIN. AFTER THAT YOU WILL BE ASKED TO ANSWER SOME QUESTIONS.

When 30 minutes have elapsed, say: STOP READING NOW PLEASE. Then have all the booklets collected.

Proceed to TESTING.

Expected student response:

In winter.

Because they had to help their parents on farms the rest of the year.

They may have had to walk long distances to school. They couldn’t speak English so it was hard to learn. There was only one teacher for many different grades.
Grade 7 Lesson Procedure Instructions

for the Experimental Treatment
GENERAL INSTRUCTIONS TO TEACHERS

Please read these preliminary instructions before you conduct the lesson.

1. As you read the questions and instructions in this handbook to your class try not to alter your normal teaching style. If you wish, you may give positive reinforcement, and repeat answers for clarity.

2. If any question does not elicit the desired response, briefly explain the correct answer to the class yourself. (The desired answer will appear in the outline).

3. Timing is important. Please adhere to the 30 minutes allowed for the lesson.

4. It is important to keep the lesson moving at a reasonable pace, or students may not have adequate time to read the text. 5. A brief plan of the lesson you will follow is outlined, here, as an overview.

5. A brief plan of the lesson you will follow is outlined, here, as an overview.
   Hand out materials. (Social Studies booklets, paper)  
   Begin timing.
   Conduct the Guided Reading of the text.
   In time remaining, students reread text to themselves.
   After 30 minutes, booklets and papers collected.
Hand out first test, and conduct according to 

TESTING instructions. These tests are collected, after time 
allocated has elapsed. Hand out second test, and conduct 
according to instructions. These tests are collected 
after allocated time has elapsed.

PROCEDURE:

Step 1: Each student should have a Social Studies booklet, and a piece of 
lined paper. Have these materials handed out.

Step 2: As they are being handed out, say: THESE ARE SOME SOCIAL STUDIES 
BOOKLETS THAT WE ARE GOING TO READ.

Step 3: When everyone has a booklet and a piece of lined paper, say: 
PLEASE LOOK AT PAGE 281 IN YOUR BOOKLET.

Step 4: At this point make a note of the STARTING TIME. (Total exposure 
time to the materials should be exactly 30 minutes from this point onwards).

Step 5: Proceed with the picture discussion of page 281. You may repeat 
students' answers for clarity and give positive reinforcement for 
correct responses. Do not change your usual teaching style, 
however. Where the question does not appear to elicit the desired 
response, you may give and/ or explain the correct answer. Try to 
ensure that the correct answer has been heard by the whole class 
before moving on to the next question.
Teacher says:

LOOK AT THE PICTURE ON PAGE 281. DOES THIS LOOK LIKE IT IS IN CANADA?

WHY NOT?

WHY DO YOU THINK THE LADY IS TALKING TO THESE MBUTI (em bu tee) NATIVES?

SEE WHAT YOU CAN FIND OUT ABOUT THE MBUTI PEOPLE. READ FROM THE MIDDLE OF THIS PAGE (point out the passage below the title) TO THE TOP OF PAGE 283. IF YOU FINISH READING BEFORE OTHERS, READ THIS PART AGAIN BECAUSE YOU WILL BE ASKED SOME QUESTIONS ABOUT IT LATER.

STOP READING NOW AND LOOK AT THE PICTURE ON PAGE 281 AGAIN. YOU CAN SEE SOMETHING IN THE PICTURE THAT IS VERY IMPORTANT TO THE MBUTI IF YOU LOOK CLOSELY. WHAT IS IT? The (Ituri) (rain) forest.

ON YOUR PIECE OF PAPER SEE IF YOU CAN WRITE DOWN 5 REASONS THE ITURI FOREST IS IMPORTANT TO THE MBUTI. WHAT 5 THINGS DOES THE FOREST PROVIDE FOR THE MBUTI?

STOP NOW. CHECK YOUR OWN ANSWERS. I WILL READ THE 5 THINGS THE FOREST PROVIDES FOR THE MBUTI.

- teacher reads correct answers ----)

Correct Answers:
1. food
2. housing
3. clothing
4. water
5. fire

HOW DID YOU DO? WHO HAD THE 5 ANSWERS? 4?

WELL DONE! NOW TURN THE PAGE AND LOOK AT THE PICTURE ON PAGE 283.

Expected student response:

no

Clothing, people, trees are different.

She is probably trying to find out about them and their way of life.

(Allow enough time for most of the class to read this part and then resume the discussion)
Teacher says:

(Picture on page 283)

THIS PICTURE SHOWS AN MBUTI WOMAN AND SOME CHILDREN. THE WOMAN IS CARRYING A BASKET. IS THIS HOW YOU WOULD CARRY A BASKET?

WHY IS IT A GOOD IDEA FOR THE WOMAN TO CARRY A BASKET USING THE HEAD STRAP AND KEEPING HER HANDS FREE? START READING FROM THE TOP OF THIS PAGE AND PUT YOUR HAND UP AS SOON AS YOU THINK YOU'VE FOUND A REASON.

LOOK AT THE PICTURE ON PAGE 282 NOW. HERE ARE SOME ANIMALS THAT LIVE IN THE ITURI RAIN FOREST. HAVE YOU SEEN ANY OF THESE ANIMALS AT A ZOO?

WHICH ONES?

NOW READ THE REST OF PAGE 283 TO THE TOP OF PAGE 284 TO FIND OUT HOW THE MBUTI HUNT THESE ANIMALS. IF YOU FINISH BEFORE OTHERS, READ THIS PART AGAIN BECAUSE YOU WILL BE ASKED SOME QUESTIONS ABOUT IT LATER.

STOP READING NOW AND LOOK AT THE PICTURE ON PAGE 282 AGAIN. — (gain answers as quickly as possible) —

WHICH ANIMAL IS TOO FIERCE TO HUNT? the leopard

WHICH ANIMAL IS TOO LARGE TO CATCH IN A NET? the elephant

WHICH TWO ANIMALS WOULD BE KILLED USING A BOW AND ARROW? woodpecker, monkey

WHICH TWO ANIMALS WOULD BE CAUGHT IN NETS? antelope, okapi

CAN YOU NAME TWO OTHER ANIMALS NOT SHOWN IN THE PICTURE THAT THE MBUTI HUNT? wild hogs, pangolin

CAN YOU NAME AN ANIMAL NOT SHOWN THAT IS TOO FIERCE FOR THE MBUTI TO HUNT? forest buffalo

WELL DONE!

TURN THE PAGE AND LOOK AT THE PICTURE ON PAGE 284 NOW.
Teacher says:

(Picture on page 284)
CAN YOU FIGURE OUT WHAT THIS MAN IS DOING? READ THE WORDS UNDER THE PICTURE FOR A CLUE.

CAN YOU FIND THE AXE IN THE PICTURE THAT IS USED TO MAKE THE HOLE IN THE TREE LARGER? PUT YOUR FINGER ON IT.

PUT YOUR FINGER ON THE HONEYCOMB AND DEAD BEES IN THE BASKET.

PUT YOUR FINGER ON THE EMBERS WRAPPED IN LEAVES THAT MAKE THE SMOKE.

PUT YOUR FINGER ON THE BEES. GOOD!

NOW READ FROM THE TOP OF THIS PAGE HALFWAY DOWN TO NUMBER 3, AND FIND OUT WHAT OTHER FOODS THE MBUTI EAT. SEE IF YOU CAN FIND 10 THINGS. IF YOU HAVE TIME YOU MAY WRITE THEM DOWN.

(Allow enough time for most of the class to do this, and then say),

STOP READING NOW. DID YOU FIND 10 THINGS? CHECK YOUR OWN. I WILL READ THE ANSWERS FOR YOU.
- teacher reads answers 

(Correct Answers:
mushrooms, roots, berries, fruits, nuts, insects, salt, termites, birds, fish)

HOW DID YOU DO? ANYONE WITH 10 OUT OF 10? 9? 8? GOOD!

LOOK AT THE PICTURE ON PAGE 285 NOW.

Expected student response:

He is collecting honey.

(Collective response)
Teacher says:

Expected student response:

(Picture on page 285)
WHAT ARE SOME THINGS IN THIS
PICTURE THAT ARE DIFFERENT THAN
WHAT YOU WOULD SEE IN THIS
COUNTRY?
clothing, hut

YES, GOOD.
NOW READ FROM THE MIDDLE OF PAGE
284 TO THE LAST PAGE OF THE BOOKLET,
HERE, (point out the stopping place
on the last page just above the title
"Mbuti Society"). TRY TO FIND OUT
WHAT ARE SOME OF THE THINGS THE
MBUTI MAKE. IF YOU FINISH AHEAD OF
OTHERS, READ THESE PAGES AGAIN.
(Allow enough time for
most of the class to read
this passage once).

STOP READING NOW, AND LOOK AT THE
PICTURE ON PAGE 285 AGAIN. CAN YOU
SEE TWO THINGS THE MBUTI MAKE WITH BARK?
clothing, dyes to decorate them

WHAT MIGHT ONE MAN BE MAKING FROM VINE?
a net

WHAT TWO THINGS DO THEY MAKE FROM SAPLINGS,
GREEN, BENDABLE WOOD? YOU CAN SEE ONLY ONE.
huts, bows to shoot arrows

WHAT TWO THINGS ON THE GROUND ARE MADE
FROM WOOD SLOWLY HARDENED IN A FIRE?
arrows, spears

WELL DONE.

Check time. If time remains out of the 30 minutes allowed, say:
I WILL GIVE YOU ANOTHER ___ MINUTES TO READ THESE PAGES AGAIN AND STUDY
THE PICTURES. AFTER THAT, YOU WILL BE ASKED TO ANSWER SOME QUESTIONS.

When 30 minutes have elapsed, say: STOP READING NOW PLEASE. Then have all
the booklets collected.

Proceed to TESTING.
Grade 7 Lesson Procedure Instructions

for the Conventional Treatment
GENERAL INSTRUCTIONS TO TEACHERS

Please read these preliminary instructions before you conduct the lesson.

1. As you read the questions and instructions in this handbook to your class try not to alter your normal teaching style. If you wish, you may give positive reinforcement, and repeat answers for clarity.

2. If any question does not elicit the desired response, briefly explain the correct answer to the class yourself. (The desired answer will appear in the outline).

3. Timing is important. Please adhere to the 30 minutes allowed for the lesson.

4. It is important to keep the lesson moving at a reasonable pace, or students may not have adequate time to read the text. 5. A brief plan of the lesson you will follow is outlined, here, as an overview.

5. A brief plan of the lesson you will follow is outlined, here, as an overview.

Hand out materials. (Social Studies booklets, paper)

Begin timing.

Conduct the Guided Reading of the text.

In time remaining, students reread text to themselves.

After 30 minutes, booklets and papers collected.
Hand out first test, and conduct according to TESTING instructions. These tests are collected, after time allocated has elapsed. Hand out second test, and conduct according to instructions. These tests are collected after allocated time has elapsed.

PROCEDURE:

Step 1: Each student should have a Social Studies booklet, and a piece of lined paper. Have these materials handed out.

Step 2: As they are being handed out, say: THESE ARE SOME SOCIAL STUDIES BOOKLETS THAT WE ARE GOING TO READ.

Step 3: When everyone has a booklet and a piece of lined paper, say:

PLEASE LOOK AT PAGE 281 IN YOUR BOOKLET.

Step 4: At this point make a note of the STARTING TIME. (Total exposure time to the materials should be exactly 30 minutes from this point onwards).

Step 5: Proceed with the Guided Reading of page 281. You may repeat students' answers for clarity and give positive reinforcement for correct responses. Do not change your usual teaching style, however. Where the question does not appear to elicit the desired response, you may give and/ or explain the correct answer. Try to ensure that the correct answer has been heard by the whole class before moving on to the next question.
Teacher says:

Look at the first page, page 281. Do you see the title in the middle of the page? What do you think these pages will be about?

Expected student response:

about the Mbuti (em bu tee) people and their way of life - in the forest

See what you can find out about the Mbuti (em bu tee) people. Read from the middle of this page (point out the passage below the title) to the top of page 283. If you finish reading before others, read this part again because you will be asked some questions about it later.

Stop reading now.

On your piece of paper see if you can write down 5 reasons the Ituri forest is important to the Mbuti. What 5 things does the forest provide for the Mbuti?

Stop now. Check your own answers. I will read the 5 things the forest provides for the Mbuti.

- teacher reads correct answers ---->

Correct Answers:
1. food
2. housing
3. clothing
4. water
5. fire

How did you do? Who had the 5 answers? 4?

Well done! Now turn the page to page 283.
Teacher says:

WHAT DO YOU THINK THE WOMEN USE BASKETS FOR? READ FROM THE TOP OF THIS PAGE AND PUT YOUR HAND UP AS SOON AS YOU THINK YOU HAVE FOUND THE ANSWER.

(give the class time to do this, then ask)

DID YOU FIND OUT? WHAT DO THE WOMEN USE BASKETS FOR?

NOW READ THE REST OF PAGE 283 TO THE TOP OF PAGE 284 TO FIND OUT HOW THE MBUTI HUNT ANIMALS. IF YOU FINISH BEFORE OTHERS, READ THIS PART AGAIN BECAUSE YOU WILL BE ASKED SOME QUESTIONS ABOUT IT LATER.

STOP READING NOW AND SEE IF YOU CAN REMEMBER SOMETHING ABOUT THE ANIMALS YOU READ ABOUT.

WHICH ANIMAL IS TOO FIERCE TO HUNT?

WHICH ANIMAL IS TOO LARGE TO CATCH IN A NET?

WHICH TWO ANIMALS ARE KILLED USING A BOW AND ARROW?

WHICH ANIMALS ARE CAUGHT IN NETS?

CAN YOU NAME ANOTHER ANIMAL THAT IS TOO FIERCE FOR THE MBUTI TO HUNT?

WELL DONE!

TURN TO PAGE 284 NOW.

Expected student response:

for holding food that they gather in the forest

(Allow time for most of the class to read this)

the leopard (or forest buffalo)

the elephant

woodpecker, monkey

antelope, okapi, pangolin, wild hogs

forest buffalo (or leopard)
THIS PAGE WILL TELL YOU ABOUT SOME OTHER FOODS THE MBUTI EAT.

READ FROM THE TOP OF THIS PAGE NOW HALFWAY DOWN, TO NUMBER 3, AND FIND OUT WHAT OTHER FOODS THE MBUTI EAT. SEE IF YOU CAN FIND 10 THINGS. IF YOU HAVE TIME YOU MAY WRITE THEM DOWN.

(Allow enough time for most of the class to do this, and then say),

STOP READING NOW. DID YOU FIND 10 THINGS? CHECK YOUR OWN. I WILL READ THE ANSWERS FOR YOU.
- teacher reads answers ---

[Correct Answers: mushrooms, roots, berries, fruits, nuts, insects, salt, termites, birds, fish]

HOW DID YOU DO? ANYONE WITH 10 OUT OF 10? 9? 8? GOOD!
Teacher says:

NOW READ FROM THE MIDDLE OF PAGE 284 TO THE LAST PAGE OF THE BOOKLET, HERE, (point out the stopping place on the last page just above the title "Mbuti Society"). TRY TO FIND OUT WHAT ARE SOME OF THE THINGS THE MBUTI MAKE. IF YOU FINISH AHEAD OF OTHERS, READ THESE PAGES AGAIN.

ALLOW ENOUGH TIME FOR MOST OF THE CLASS TO READ THIS PASSAGE ONCE).

STOP READING NOW.

CAN YOU TELL ME TWO THINGS THE MBUTI MAKE WITH BARK?

Clothing, dyes to decorate them

WHAT DO THE MBUTI MAKE WITH VINE?

Nets

CAN YOU THINK OF TWO THINGS THEY MAKE FROM SAPLINGS - GREEN, BENDABLE WOOD?

Huts, bows to shoot arrows

WHAT TWO THINGS DO THE MBUTI MAKE WITH WOOD WHICH HAS BEEN SLOWLY HARDENED OVER A FIRE?

Arrows, spears

WELL DONE.

Check time. If time remains out of the 30 minutes allowed, say:

I WILL GIVE YOU ANOTHER ___ MINUTES TO READ AND STUDY THESE PAGES AGAIN. AFTER THAT, YOU WILL BE ASKED TO ANSWER SOME QUESTIONS.

When 30 minutes have elapsed, say: STOP READING NOW PLEASE. Then have all the booklets collected.

Proceed to TESTING.
Appendix D

Letters of Permission from Publishers Concerned
Appendix E

Text Booklets for Fifth and Seventh Grade Students
Text Booklet for Fifth Grade Students
The customs and traditions Ukrainian families continued in Canada were a special way of remembering their old country. Parents wanted their children to grow up knowing about Western Ukraine.

The Ukrainian settlers also wanted their children to learn about Canada. As they became more settled on their homesteads many Ukrainians wanted to send their children to school.

One Ukrainian boy, Wasyl Shandro, whose family settled northeast of Edmonton, explained how his first school was built:

People began coming into our area in 1899, and by 1905 it was quite settled. The community was called Shandro after my father who was one of the first settlers here.

My father called a meeting at our house about building a school. All the Ukrainian homesteaders came. There were some who did not want a school because they would have to pay school taxes. They said “We came to Canada to get away from all those taxes.” However, when they heard that it was the law in Alberta that children must go to school or parents could be fined, they changed their minds. Then everyone wanted a school.

The homesteaders elected a small group of people called school trustees to build a school and hire a teacher. Our first teacher came to stay at our home because my father was a school trustee. During the year the teacher also stayed with the families of other schoolchildren. The room and board they provided were part of the teacher’s wages.
How might the children of Ukrainian immigrants have felt as they watched their parents building a new school?
In some schools the students only spoke Ukrainian and the teacher only spoke English. Wasyly Shandro described what his class and teacher did in their first lessons together:

When school started I was ten years old. On my first day, the teacher opened a big trunk and pulled out some pictures. First there was a picture of a horse. So all the children said "kin" in Ukrainian. The teacher said "horse". We repeated "horse". Then he took out other pictures: "cat", "dog", "boy", "girl". We repeated the words after him. In about two weeks we could speak some English.

In other schools there were only a few Ukrainian students. Petro Humeniuk wrote about his first day at the school near Stuartburn. The school had been built in 1888 for the children of British settlers.

When I first went to school in 1906 I was already 11 years old. On my first school day I dressed in neat, clean clothes and took a sandwich my mother had made for me.

In the school yard there were many English-speaking children I did not know. They seemed to be running in all directions. Some were shouting "Ante Ante Over" and throwing a ball over the school roof to children waiting on the other side. I stood by myself near the door and felt very lonely and bewildered.

Soon the teacher appeared in the doorway and rang a bell. All the children ran inside. Because I was shy I was almost the last to go in. I stood inside the door until the teacher beckoned me to come to her desk. She asked me something I did not understand so she called a little six-year-old girl named Maria Wachna to help her. In Ukrainian Maria asked me my name and age. Right there and then I lost my name "Petro". The teacher wrote my name differently in her book. Pointing at me she told the class "This is "Peter"." [Peter is the English way of spelling my name.]

Out of all the children in the class Maria and I were the only two Ukrainians.
Petro described how he learned to read English:

At home my parents had taught me the letters of the English alphabet. I knew one sound for each letter. That is the way the Ukrainian alphabet works. If people can memorize the sound of each letter they can easily learn to read any Ukrainian words or sentences in a few days. I thought English would be the same.

On my first day at school, the teacher gave me a book with written and printed words and pictures of a large shaggy dog. I read the page about the dog for the teacher without knowing how to say the words properly. "Dog. A dog. This is Duke. I like my dog."

All the children laughed at my reading at first, but each day in school gave me more confidence. Soon I knew the meaning of single words, then short sentences. Within two months I was able to talk to the children.

On the last day of my first year at school we had a concert and the parents of all the children came. Maria Wachna sang a song in Ukrainian and I recited a tongue twister:

Betty Botter bought a bit of bitter butter. But it made her batter bitter. So she bought another bit of butter better than the bitter butter and made her bitter batter better.

All the students sang Canadian songs. We sang "The Maple Leaf Forever" and "God Save The King".

If you were a Ukrainian parent in Canada which language would you most want your children to learn to read and write — English or Ukrainian? Why?

How would you feel if you were Petro Humeniuk or Maria Wachna going to school with so many English-speaking students?
Children on the homesteads went to school in winter when the ground was frozen and there was no work to be done in the fields. They were taught English, reading, writing and arithmetic.

For some Ukrainian students, going to school was difficult. Many did not even finish grade five. One girl named Eva Kretzel, whose family settled near Smoky Lake, Alberta, explained the problems children had in her school:

Some of the children had to walk as far as six miles [10 km] to school. It was hard for us to learn. We didn’t know English and there were eight or nine grades in one room with only one teacher. I spent two and a half years in grade one. It took me two years to learn how to read.

If Ukrainian students like these could not learn at school because their teacher only spoke English, what might the school trustees do to solve the problem?
Text Booklet for Seventh Grade Students
In the 1950s, he lived with the Mbuti for more than a year. He hunted with them, joined in their celebrations, observed their arguments and agreements and filled notebook after notebook with observations on their life.

Since then, Turnbull has returned many times to visit and live with the people he considers his friends. He has provided us with a great deal of information about the Mbuti. Much of the information in this chapter comes from Colin Turnbull's observations.

1. Suggest reasons why the Mbuti were not able to successfully compete for land with the Bantu and so were pushed back into the forests.
2. Anthropologists study groups of people by living near them or with them. What might be some of the problems with this research method?
3. Suppose you were the first anthropologist to ever study the Mbuti. Make a list of five questions you would want answers to before you were finished with your work.

THE FOREST ECONOMY AND THE MBUTI WAY OF LIFE

The Mbuti call themselves the children of the forest. They say the forest is their father and their mother because it provides for all their needs: food, housing, clothing, water and fire. The Mbuti share in all the gifts of the forest. They relate closely to the physical environment in all their activities and beliefs.

The Mbuti economy centres on the hunt. Some Mbuti groups hunt with bows and arrows, others with nets. The night before a net hunt, men and women gather around a fire to decide where they will hunt in the morning. Early the next day, the group sets out, with the adult male in each family carrying a net made with forest vines. Each net is up to 100 m long. The men and teenage boys go first and fastest. When they arrive at the place chosen for the hunt, they set up their nets. Each net is joined to its neighbor,
Some of the plants and animals of the Ituri forest are shown on these pages. In their traditional way of life, the Mbuti depended on the forest for almost everything in their lives. Look at these pictures and read the information. Some questions you should answer are:

1. What might the Mbuti eat?
2. How might they obtain their food?
3. What might their houses be made of?
4. What might they wear? What might their clothes be made of?
5. How might they use vines, leaves, roots and tree bark?
6. How might they use other products they obtain in the forest?
so that a semicircle is enclosed by nets. Since a semicircle must be large to do its job properly, each net-hunting camp must contain at least six families, each with a net.

The women follow, gathering mushrooms, roots, nuts, berries and grubs on the way. They place these in the bark baskets they carry on their backs.

When everyone arrives at the hunting site, the women move quietly out into the forest. For a while, there is no sound. The men stand carefully beside their nets. Then, the noise begins: the women shout and stamp on the ground as they move toward the nets, trying to stampede animals toward the male hunters.

An antelope breaks out of the forest, headed straight for the centre of the nets. It does not see them, and is quickly trapped in the mesh. Three Mbuti stand over it and spear it to death. To left and right, other hunters deal with other game, perhaps another antelope, wild hogs or okapi, that have been chased into the net. At the end of the nets stand the teenage boys; their job is to net or spear any animals that escape the semicircle.

Once the hunt is over, the men cut the meat up into pieces small enough to go into the women's baskets. The villagers divide the meat according to the custom of the village. Usually, the hunter whose net caught the animal receives the best pieces: the heart and the liver. No one goes without; each family receives some of the catch.

Bow hunters usually act in pairs or in groups of three. Pangolin, monkeys and other animals that live in trees must be killed with bow and arrow, since they cannot be stampeded into a net. The arrows are often coated with a poison made from a forest plant, the kilabo. This poison is harmless to people once the meat has been cooked. Bow hunters share the meat with everyone in the camp. Bow-hunting camps are usually smaller than net-hunting camps, since hunting with bow and arrow does not demand the co-operation of many people.

Most often, the Mbuti hunt and kill antelope or some of the smaller animals you saw on page 282. If they are very lucky, hunters may kill an elephant. They do this either by digging a pit trap, then spearing the elephant when it falls into the pit, or by
creeping up on the elephant and cutting the tendons in its hind legs. When the elephant sinks to its knees, Mbuti hunters rush in to spear it to death. Mbuti do not try to kill leopards or forest buffalo, the fiercest and most dangerous animals in the forest.

Much of the Mbuti diet comes from gathering mushrooms, roots, berries, fruits, nuts and insects in the forest. Both males and females are expert in finding and gathering these resources. Their favorite root comes from the itaba vine; it is sweet-tasting, and can be roasted or stewed. Honey is a great favorite, as are termites. The finding of a termite nest is a special occasion. The termites are toasted over the fire and eaten. To obtain salt, the Mbuti burn the green branches of the “salt tree,” then collect and boil the ashes for a day. When the water evaporates, a type of salt remains.

The Mbuti eat birds they shoot with arrows, and occasionally fish, although they prefer meat.

1. List the advantages and disadvantages of hunting with a net.
2. Compare net and bow hunting using these headings:
   number of people involved, equipment needed, animals hunted.
3. Describe how the Mbuti get salt.

The forest also supplies the Mbuti with clothing. They make their simple clothing from bark, scraped and boiled to make it soft, then decorated with red and black dyes, made from the bark of the nkula (nkübå) tree and from the kangay (kan’gå) plant. Adults wear a breechcloth, held up by a fibre belt. They also may wear fibre armbands and necklaces. Children generally go naked.

The forest environment also provides the raw materials for hunters. Nets are woven from the nkusa vine. Women shred the vine, then roll pieces together to make a strong cord that the men can weave into a net. Bows are made from saplings, and spears and arrow tips from wood that has been slowly hardened in a fire. The hunters make a poison from a local plant which they use...
on their arrows. Pieces of bamboo can be used as cutting tools, and sticks are used to dig honey out of a bees' nest or tree.

Each Mbuti group lives at one site in the forest for only a month, until they have gathered most of the edible plants in the area and animals are becoming scarce. Because they do not have toilets or latrines, their water supply could easily become polluted. When they move to a new site, somewhere else in their section of the forest, and build a new camp, they avoid the problem of pollution. Moving is easily accomplished because they have few possessions, just a few tools and nets. The forest in the new location will supply resources for all their other needs.

Fire is important to the Mbuti, for cooking and for making weapons. Yet the Mbuti do not know how to start a fire. They are careful always to have at least one fire burning, so that they may start new fires from the old. When the camp moves, women carry smoldering coals wrapped in special leaves that do not catch fire. When the group arrives at the new campsite, or when

The Mbuti rely on the forest for materials to meet their needs. How are the Mbuti pictured here making use of their environment?
the group stops on the trail for a rest, each woman carefully makes a new fire. To do this, the women add dry twigs to the coal and blow on the twigs until they catch fire.

The Mbuti make their huts from young, straight saplings and the leaves of the mogongo tree. As soon as they arrive at the new site, the women go into the forest to cut down saplings and collect leaves. Usually working in pairs, they quickly drive the saplings into the ground, to make a beehive-shaped framework. Then they tie the large leaves onto the framework, making a waterproof shelter for their family.

Mbuti children have no formal schools; instead, they learn such tasks as fire-building, hunting and hut-building by copying the older people in the village. They play in the bopi, a special area just outside the village, away from the adults but close enough for help should trouble occur. Here, they may play in the trees, or pretend to be hunting or building houses.

1. List the foods the Mbuti eat. How do they find their food in the forest?
2. Explain why the forest is so important to the Mbuti. What does it provide them with?
3. Try making a model of a Mbuti house using natural things you find outdoors.

MBUTI SOCIETY

The Mbuti have no chiefs to tell everyone else what to do. Every decision in a Mbuti village is made through discussion and agreement. Everyone, including children, takes part in deciding where to hunt, when to move or where to move to. Some people's views may carry more weight than others. The best hunter in a camp will have more say over where the group should hunt. In some cases, the men may want to hunt in a certain area, but the women will know there are no plants to collect there. The women will then usually persuade the men to hunt elsewhere.

What happens if the group cannot agree? Then the family that does not want to go along with the group may leave and join a
Appendix F

Testing Instructions Booklets for Immediate and Delayed Testing
Grade 5 Immediate and Delayed Testing

Instructions
TESTING INSTRUCTIONS

There are two tests: 1) a Short Answer Recall test, and, 2) a Multiple Choice test.

PROCEDURE:

Step 1: Hand out the Short Answer Recall tests, one for each student. Place face down on desks.

Step 2: When all students have a paper, ask the class to turn their papers over and write in their school's name, their name, their gender, and the language spoken at home.

Step 3: Read the instructions at the top of the test paper and ensure that all students understand what they are to do.

Step 4: When the instructions are understood, make a note of the Starting Time and say, IF YOU FINISH BEFORE OTHERS, GO BACK OVER YOUR PAPER AND CHECK YOUR ANSWERS. TRY TO REMEMBER AS MUCH AS YOU CAN. YOU WILL HAVE 8 MINUTES. YOU MAY BEGIN NOW.

Step 5: After exactly 8 minutes have elapsed, say, PLEASE STOP WHAT YOU ARE DOING NOW AND TURN YOUR PAPER OVER. Then have all papers collected.

Step 6: (continued over.... )
Step 6: Hand out the Multiple Choice tests, one for each student. Place face down on desks.

Step 7: When all students have a test paper, ask the class to turn over their papers and write in their school's name, their name, and their gender.

Step 8: Read the instructions on the test and make sure that all students know they are to mark only one answer for each question.

Step 9: When the instructions are understood, make a note of the Starting Time and say, IF YOU FINISH THE QUESTIONS BEFORE OTHERS, GO OVER YOUR ANSWERS AND CHECK THAT YOU MARKED ONLY ONE CHOICE FOR EACH QUESTION. DO THE BEST THAT YOU CAN. YOU WILL HAVE 5 MINUTES. YOU MAY BEGIN NOW.

Step 10: After exactly 5 minutes have elapsed, say, PLEASE STOP WHAT YOU ARE DOING NOW AND TURN YOUR PAPERS OVER. Then have all the papers collected.
There are two tests: 1) a Multiple Choice test.
and, 2) a Short Answer Recall test.

PROCEDURE:

Step 1: Hand out the Multiple Choice tests, one for each student.
Place face down on desks.

Step 2: When all students have a test paper, ask the class to turn over their papers and write in their school's name, their name, and their gender.

Step 3: Read the instructions on the test and make sure that all students know they are to mark only one answer for each question.

Step 4: When the instructions are understood, make a note of the Starting Time and say, IF YOU FINISH THE QUESTIONS BEFORE OTHERS, GO OVER YOUR ANSWERS AND CHECK THAT YOU MARKED ONLY ONE CHOICE FOR EACH QUESTION. DO THE BEST THAT YOU CAN. YOU WILL HAVE 5 MINUTES. YOU MAY BEGIN NOW.

Step 5: After exactly 5 minutes have elapsed, say, PLEASE STOP WHAT YOU ARE DOING NOW AND TURN YOUR PAPERS OVER. Then have all the papers collected.
Step 6: Hand out the Short Answer Recall tests, one for each student. Place face down on desks.

Step 7: When all students have a paper, ask the class to turn their papers over and write in their school's name, their name, their gender, and the language spoken at home.

Step 8: Read the instructions at the top of the test paper and ensure that all students understand what they are to do.

Step 9: When the instructions are understood, make a note of the Starting Time and say, IF YOU FINISH BEFORE OTHERS, GO BACK OVER YOUR PAPER AND CHECK YOUR ANSWERS. TRY TO REMEMBER AS MUCH AS YOU CAN. YOU WILL HAVE 8 MINUTES. YOU MAY BEGIN NOW.

Step 10: After exactly 8 minutes have elapsed, say, PLEASE STOP WHAT YOU ARE DOING NOW AND TURN YOUR PAPER OVER. Then have all papers collected.
TESTING INSTRUCTIONS

There are two tests: 1) a Short Answer Recall test, and, 2) a Multiple Choice test.

PROCEDURE:

Step 1: Teacher says, DO YOU REMEMBER THE SOCIAL STUDIES LESSON WE DID TWO WEEKS AGO ABOUT THE UKRAINIANS? THESE ARE SOME TESTS TO SEE HOW MUCH YOU CAN STILL REMEMBER.

Step 2: Hand out the Short Answer Recall tests, one for each student. Place face down on desks.

Step 3: When all students have a paper, ask the class to turn their papers over and write in their school's name, their name, their gender, and the language spoken at home.

Step 4: Read the instructions at the top of the test paper and ensure that all students understand what they are to do.

Step 5: When the instructions are understood, make a note of the Starting Time and say, IF YOU FINISH BEFORE OTHERS, GO BACK OVER YOUR PAPER AND CHECK YOUR ANSWERS. TRY TO REMEMBER AS MUCH AS YOU CAN. YOU WILL HAVE 8 MINUTES. YOU MAY BEGIN NOW.
Step 6: After exactly 8 minutes have elapsed, say, PLEASE STOP WHAT YOU ARE DOING NOW AND TURN YOUR PAPER OVER. Then have all papers collected.

Step 7: Hand out the Multiple Choice tests, one for each student. Place face down on desks.

Step 8: When all students have a test paper, ask the class to turn over their papers and write in their school's name, their name, and their gender.

Step 9: Read the instructions on the test and make sure that all students know they are to mark only one answer for each question.

Step 10: When the instructions are understood, make a note of the Starting Time and say, IF YOU FINISH THE QUESTIONS BEFORE OTHERS, GO OVER YOUR ANSWERS AND CHECK THAT YOU MARKED ONLY ONE CHOICE FOR EACH QUESTION. DO THE BEST THAT YOU CAN. YOU WILL HAVE 5 MINUTES. YOU MAY BEGIN NOW.

Step 11: After exactly 5 minutes have elapsed, say, PLEASE STOP WHAT YOU ARE DOING NOW AND TURN YOUR PAPERS OVER. Then have all the papers collected.
TESTING INSTRUCTIONS

There are two tests: 1) a Multiple Choice test, and, 2) a Short Answer Recall test.

PROCEDURE:

Step 1: Teacher says, DO YOU REMEMBER THE SOCIAL STUDIES LESSON WE DID TWO WEEKS AGO ABOUT THE UKRAINIANS? THESE ARE SOME TESTS TO SEE HOW MUCH YOU CAN STILL REMEMBER.

Step 2: Hand out the Multiple Choice tests, one for each student. Place face down on desks.

Step 3: When all students have a test paper, ask the class to turn over their papers and write in their school's name, their name, and their gender.

Step 4: Read the instructions on the test and make sure that all students know they are to mark only one answer for each question.

Step 5: When the instructions are understood, make a note of the Starting Time and say, IF YOU FINISH THE QUESTIONS BEFORE OTHERS, GO OVER YOUR ANSWERS AND CHECK THAT YOU MARKED ONLY ONE CHOICE FOR EACH QUESTION. DO THE BEST THAT YOU CAN. YOU WILL HAVE 5 MINUTES. YOU MAY BEGIN NOW.

Step 6: (continued over....)
Step 6: After exactly 5 minutes have elapsed, say, PLEASE STOP WHAT YOU ARE DOING NOW AND TURN YOUR PAPERS OVER. Then have all the papers collected.

Step 7: Hand out the Short Answer Recall tests, one for each student. Place face down on desks.

Step 8: When all students have a paper, ask the class to turn their papers over and write in their school's name, their name, their gender, and the language spoken at home.

Step 9: Read the instructions at the top of the test paper and ensure that all students understand what they are to do.

Step 10: When the instructions are understood, make a note of the Starting Time and say, IF YOU FINISH BEFORE OTHERS, GO BACK OVER YOUR PAPER AND CHECK YOUR ANSWERS. TRY TO REMEMBER AS MUCH AS YOU CAN. YOU WILL HAVE 8 MINUTES. YOU MAY BEGIN NOW.

Step 11: After exactly 8 minutes have elapsed, say, PLEASE STOP WHAT YOU ARE DOING NOW AND TURN YOUR PAPER OVER. Then have all papers collected.
Grade 7 Immediate and Delayed Testing Instructions
TESTING INSTRUCTIONS

There are two tests: 1) a Multiple Choice test,
and, 2) a Short Answer Recall test.

PROCEDURE:

Step 1: Hand out the Multiple Choice tests, one for each student.
Place face down on desks.

Step 2: When all students have a test paper, ask the class to turn over their papers and write in their school's name, their name, and their gender.

Step 3: Read the instructions on the test and make sure that all students know they are to mark only one answer for each question.

Step 4: When the instructions are understood, make a note of the Starting Time and say, IF YOU FINISH THE QUESTIONS BEFORE OTHERS, GO OVER YOUR ANSWERS AND CHECK THAT YOU MARKED ONLY ONE CHOICE FOR EACH QUESTION. DO THE BEST THAT YOU CAN. YOU WILL HAVE 5 MINUTES. YOU MAY BEGIN NOW.

Step 5: After exactly 5 minutes have elapsed, say, PLEASE STOP WHAT YOU ARE DOING NOW AND TURN YOUR PAPERS OVER. Then have all the papers collected.

Step 6: (continued over.....)
Step 6: Hand out the Short Answer Recall tests, one for each student. Place face down on desks.

Step 7: When all students have a paper, ask the class to turn their papers over and write in their school's name, their name, their gender, and the language spoken at home.

Step 8: Read the instructions at the top of the test paper and ensure that all students understand what they are to do.

Step 9: When the instructions are understood, make a note of the Starting Time and say, IF YOU FINISH BEFORE OTHERS, GO BACK OVER YOUR PAPER AND CHECK YOUR ANSWERS. TRY TO REMEMBER AS MUCH AS YOU CAN. YOU WILL HAVE 8 MINUTES. YOU MAY BEGIN NOW.

Step 10: After exactly 8 minutes have elapsed, say, PLEASE STOP WHAT YOU ARE DOING NOW AND TURN YOUR PAPER OVER. Then have all papers collected.
TESTING INSTRUCTIONS

There are two tests: 1) a Short Answer Recall test, and, 2) a Multiple Choice test.

PROCEDURE:

Step 1: Hand out the Short Answer Recall tests, one for each student. Place face down on desks.

Step 2: When all students have a paper, ask the class to turn their papers over and write in their school's name, their name, their gender, and the language spoken at home.

Step 3: Read the instructions at the top of the test paper and ensure that all students understand what they are to do.

Step 4: When the instructions are understood, make a note of the Starting Time and say, IF YOU FINISH BEFORE OTHERS, GO BACK OVER YOUR PAPER AND CHECK YOUR ANSWERS. TRY TO REMEMBER AS MUCH AS YOU CAN. YOU WILL HAVE 8 MINUTES. YOU MAY BEGIN NOW.

Step 5: After exactly 8 minutes have elapsed, say, PLEASE STOP WHAT YOU ARE DOING NOW AND TURN YOUR PAPER OVER. Then have all papers collected.

Step 6: (continued over.....)
Step 6: Hand out the Multiple Choice tests, one for each student.
Place face down on desks.

Step 7: When all students have a test paper, ask the class to turn over their papers and write in their school's name, their name, and their gender.

Step 8: Read the instructions on the test and make sure that all students know they are to mark only one answer for each question.

Step 9: When the instructions are understood, make a note of the Starting Time and say, IF YOU FINISH THE QUESTIONS BEFORE OTHERS, GO OVER YOUR ANSWERS AND CHECK THAT YOU MARKED ONLY ONE CHOICE FOR EACH QUESTION. DO THE BEST THAT YOU CAN. YOU WILL HAVE 5 MINUTES. YOU MAY BEGIN NOW.

Step 10: After exactly 5 minutes have elapsed, say, PLEASE STOP WHAT YOU ARE DOING NOW AND TURN YOUR PAPERS OVER. Then have all the papers collected.
TESTING INSTRUCTIONS

There are two tests: 1) a Short Answer Recall test, and, 2) a Multiple Choice test.

PROCEDURE:

Step 1: Teacher says, DO YOU REMEMBER THE SOCIAL STUDIES LESSON WE DID TWO WEEKS AGO ABOUT THE MBUTI? THESE ARE SOME TESTS TO SEE HOW MUCH YOU CAN STILL REMEMBER.

Step 2: Hand out the Short Answer Recall tests, one for each student. Place face down on desks.

Step 3: When all students have a paper, ask the class to turn their papers over and write in their school's name, their name, their gender, and the language spoken at home.

Step 4: Read the instructions at the top of the test paper and ensure that all students understand what they are to do.

Step 5: When the instructions are understood, make a note of the Starting Time and say, IF YOU FINISH BEFORE OTHERS, GO BACK OVER YOUR PAPER AND CHECK YOUR ANSWERS. TRY TO REMEMBER AS MUCH AS YOU CAN. YOU WILL HAVE 8 MINUTES. YOU MAY BEGIN NOW.
Step 6: After exactly 8 minutes have elapsed, say, PLEASE STOP WHAT YOU ARE DOING NOW AND TURN YOUR PAPER OVER. Then have all papers collected.

Step 7: Hand out the Multiple Choice tests, one for each student.

Place face down on desks.

Step 8: When all students have a test paper, ask the class to turn over their papers and write in their school's name, their name, and their gender.

Step 9: Read the instructions on the test and make sure that all students know they are to mark only one answer for each question.

Step 10: When the instructions are understood, make a note of the Starting Time and say, IF YOU FINISH THE QUESTIONS BEFORE OTHERS, GO OVER YOUR ANSWERS AND CHECK THAT YOU MARKED ONLY ONE CHOICE FOR EACH QUESTION.

DO THE BEST THAT YOU CAN. YOU WILL HAVE 5 MINUTES. YOU MAY BEGIN NOW.

Step 11: After exactly 5 minutes have elapsed, say, PLEASE STOP WHAT YOU ARE DOING NOW AND TURN YOUR PAPERS OVER. Then have all the papers collected.
There are two tests: 1) a Multiple Choice test, and, 2) a Short Answer Recall test.

PROCEDURE:

Step 1: Teacher says, DO YOU REMEMBER THE SOCIAL STUDIES LESSON WE DID TWO WEEKS AGO ABOUT THE MBUTI? THESE ARE SOME TESTS TO SEE HOW MUCH YOU CAN STILL REMEMBER.

Step 2: Hand out the Multiple Choice tests, one for each student. Place face down on desks.

Step 3: When all students have a test paper, ask the class to turn over their papers and write in their school's name, their name, and their gender.

Step 4: Read the instructions on the test and make sure that all students know they are to mark only one answer for each question.

Step 5: When the instructions are understood, make a note of the Starting Time and say, IF YOU FINISH THE QUESTIONS BEFORE OTHERS, GO OVER YOUR ANSWERS AND CHECK THAT YOU MARKED ONLY ONE CHOICE FOR EACH QUESTION. DO THE BEST THAT YOU CAN. YOU WILL HAVE 5 MINUTES. YOU MAY BEGIN NOW.

Step 6: (continued over.....)
Step 6: After exactly 5 minutes have elapsed, say, PLEASE STOP WHAT YOU ARE DOING NOW AND TURN YOUR PAPERS OVER. Then have all the papers collected.

Step 7: Hand out the Short Answer Recall tests, one for each student. Place face down on desks.

Step 8: When all students have a paper, ask the class to turn their papers over and write in their school's name, their name, their gender, and the language spoken at home.

Step 9: Read the instructions at the top of the test paper and ensure that all students understand what they are to do.

Step 10: When the instructions are understood, make a note of the Starting Time and say, IF YOU FINISH BEFORE OTHERS, GO BACK OVER YOUR PAPER AND CHECK YOUR ANSWERS. TRY TO REMEMBER AS MUCH AS YOU CAN. YOU WILL HAVE 8 MINUTES. YOU MAY BEGIN NOW.

Step 11: After exactly 8 minutes have elapsed, say, PLEASE STOP WHAT YOU ARE DOING NOW AND TURN YOUR PAPER OVER. Then have all papers collected.
Appendix G

Immediate and Delayed Multiple Choice Tests
Grade 5 Immediate and Delayed Multiple Choice Tests
1. Who wanted to have a school?
(A) a few of the school trustees
(B) most of the Ukrainian parents
(C) some of the English settlers
(D) the children living on homesteads

2. When did many Ukrainian families settle in Canada?
(A) about 20 years ago
(B) during the 1940's
(C) in the mid 1850's
(D) in the early 1900's

3. Where did the teacher live?
(A) in a boarding house provided
(B) in different families' homes
(C) in homes of English settlers
(D) in a separate part of the school

4. Who was given an English name at school?
(A) Eva
(B) Maria
(C) Petro
(D) Wasyl

5. What subjects were taught at school?
(A) arithmetic, English, reading, writing
(B) English, reading, writing, social studies
(C) reading, writing, English, spelling
(D) writing, reading, arithmetic, spelling
6. What happened to Petro on his first day at school?
(A) the children laughed at his reading
(B) the students stared at his clothes
(C) the teacher gave him a desk to sit at
(D) the children played games with him

7. What was the main reason school was so difficult for Ukrainian students?
(A) one class had many different grades in it
(B) English wasn't the language they were used to
(C) there were many new and strange customs to learn
(D) Ukrainian alphabet is different than the English

8. How many students were Ukrainian in Wasyl's class?
(A) only two
(B) just a few
(C) most of them
(D) all of them

9. Why did Ukrainian children go to school only in winter?
(A) the ground was frozen
(B) it was too hot in summer
(C) it was hard to get a teacher
(D) there was no farm work

10. How many different grades were in Eva's class at school?
(A) six
(B) seven
(C) eight
(D) nine
1. What subjects were taught at school?
   (A) arithmetic, English, reading, writing
   (B) English, reading, writing, social studies
   (C) reading, writing, English, spelling
   (D) writing, reading, arithmetic, spelling

2. What was the main reason school was so difficult for Ukrainian students?
   (A) one class had many different grades in it
   (B) English wasn't the language they were used to
   (C) there were many new and strange customs to learn
   (D) Ukrainian alphabet is different than the English

3. How many different grades were in Eva's class at school?
   (A) six
   (B) seven
   (C) eight
   (D) nine

4. When did many Ukrainian families settle in Canada?
   (A) about 20 years ago
   (B) during the 1940's
   (C) in the mid 1850's
   (D) in the early 1900's

5. Why did Ukrainian children go to school only in winter?
   (A) the ground was frozen
   (B) it was too hot in summer
   (C) it was hard to get a teacher
   (D) there was no farm work
6. Who was given an English name at school?

(A) Eva

(B) Maria

(C) Petro

(D) Wasyl

7. How many students were Ukrainian in Wasyl's class?

(A) only two

(B) just a few

(C) most of them

(D) all of them

8. Who wanted to have a school?

(A) a few of the school trustees

(B) most of the Ukrainian parents

(C) some of the English settlers

(D) the children living on homesteads

9. Where did the teacher live?

(A) in a boarding house provided

(B) in different families' homes

(C) in homes of English settlers

(D) in a separate part of the school

10. What happened to Petro on his first day at school?

(A) the children laughed at his reading

(B) the students stared at his clothes

(C) the teacher gave him a desk to sit at

(D) the children played games with him
Grade 7 Immediate and Delayed Multiple Choice Tests
1. Each net-hunting camp must contain at least
(A) 3 families
(B) 4 families
(C) 5 families
(D) 6 families

2. Why do the Mbuti call themselves the "children of the forest?"
(A) the forest has always been their home
(B) the Mbuti are excellent tree climbers
(C) the forest is worshipped by the Mbuti
(D) all they need to live is in the forest

3. The heart and liver are kept by the hunter whose
(A) family chased the animal
(B) net caught the animal
(C) spear killed the animal
(D) shouts frightened the animal

4. Two animals that the Mbuti catch in nets are
(A) elephant, leopard
(B) monkey, okapi
(C) buffalo, pangolin
(D) antelope, wild hog

5. Kilabo poison is harmless when meat containing it is
(A) cooked over the fire
(B) coated with nkula
(C) washed carefully
(D) left to dry in the sun
6. Animals that the Mbuti hunt are
(A) birds, hyenas, snakes
(B) okapi, monkey, leopard
(C) pangolin, woodpecker, antelope
(D) buffalo, elephant, wild hog

7. Foods which are special favourites of the Mbuti are
(A) honey, wild hog, kangay plant
(B) itaba root, honey, termites
(C) birds, toasted termites, fish
(D) liver, salt, mushrooms

8. The Mbuti move to a new campsite after
(A) 2 weeks
(B) 1 month
(C) 6 weeks
(D) 2 months

9. The Mbuti use forest materials to make
(A) mats, arrows, tools
(B) huts, poison, seats
(C) nets, spears, legbands
(D) necklaces, dyes, cord

10. The Mbuti children learn how to
(A) copy the older people tell stories
(B) build huts and make fires
(C) hunt animals and weave cloth
(D) play bopi and hide in the grass
1. Animals that the Mbuti hunt are
(A) birds, hyenas, snakes
(B) okapi, monkey, leopard
(C) pangolin, woodpecker, antelope
(D) buffalo, elephant, wild hog

2. Two animals that the Mbuti catch in nets are
(A) elephant, leopard
(B) monkey, okapi
(C) buffalo, pangolin
(D) antelope, wild hog

3. The Mbuti move to a new campsite after
(A) 2 weeks
(B) 1 month
(C) 6 weeks
(D) 2 months

4. Why do the Mbuti call themselves the "children of the forest?"
(A) the forest has always been their home
(B) the Mbuti are excellent tree climbers
(C) the forest is worshipped by the Mbuti
(D) all they need to live is in the forest

5. The Mbuti children learn how to
(A) copy the older people tell stories
(B) build huts and make fires
(C) hunt animals and weave cloth
(D) play bopi and hide in the grass
6. Each net-hunting camp must contain at least
   (A) 3 families
   (B) 4 families
   (C) 5 families
   (D) 6 families

7. Foods which are special favourites of the Mbuti are
   (A) honey, wild hog, kangay plant
   (B) itaba root, honey, termites
   (C) birds, toasted termites, fish
   (D) liver, salt, mushrooms

8. Kilabo poison is harmless when meat containing it is
   (A) cooked over the fire
   (B) coated with nkula
   (C) washed carefully
   (D) left to dry in the sun

9. The Mbuti use forest materials to make
   (A) mats, arrows, tools
   (B) huts, poison, seats
   (C) nets, spears, legbands
   (D) necklaces, dyes, cord

10. The heart and liver are kept by the hunter whose
    (A) family chased the animal
    (B) net caught the animal
    (C) spear killed the animal
    (D) shouts frightened the animal
Appendix H

Immediate and Delayed Short Answer Tests
Answer each question in a few words. Try to remember as much as you can.

1. What country did the Ukrainian immigrants come from? 

2. What two jobs did the school trustees do? 

3. What language did Maria, Eva, Wasyli, and Petro speak at home? 

4. How did Petro Humeniuk feel on his first day at school? 

5. If you went to school in the early 1900's, what things would be different? List as many differences as you can remember.

6. What were some of the things the children did at a school concert? List as many as you remember.
When is your birthday? __________________________ How old are you now?________

Answer each question in a few words. Try to remember as much as you can.

1. How did Petro Humeniuk feel on his first day at school? ________________________________

2. What were some of the things the children did at a school concert? List as many as you remember.
   ________________________________________________
   ________________________________________________
   ________________________________________________
   ________________________________________________
   ________________________________________________

3. What two jobs did the school trustees do? ________________________________
   ________________________________________________
   ________________________________________________

4. If you went to school in the early 1900's, what things would be different? List as many differences as you can remember.
   ________________________________________________
   ________________________________________________
   ________________________________________________
   ________________________________________________
   ________________________________________________

5. What country did the Ukrainian immigrants come from? ________________________________

6. What language did Maria, Eva, Wasyl, and Petro speak at home? ________________________________
Grade 5 Immediate and Delayed Short Answer Tests
Grade 7 Immediate and Delayed Short Answer Tests
SCHOOL:  

NAME:  M  F  

WHAT LANGUAGE DO YOU SPEAK AT HOME?  

Answer each question in a few words. Try to remember as much as you can.

1. The Mbuti depend on  for all their needs.

2. One main activity of the Mbuti is  

3. Name as many animals as you can remember that are found where the Mbuti live.  

4. Besides the animals that are hunted, what other foods do the Mbuti find in the jungle? (Name as many as you can remember)  

5. Can you describe three methods the Mbuti use to hunt animals?  

6. Why is it easy for the Mbuti to move to a new campsite?  

7. Name as many things as you can that the Mbuti make.
When is your birthday? ______________________ How old are you now? ________________

Answer each question in a few words. Try to remember as much as you can.

1. Name as many animals as you can remember that are found where the Mbuti live. __________________________________________________________

2. Can you describe three methods the Mbuti use to hunt animals? ____________________________

3. Why is it easy for the Mbuti to move to a new campsite? ____________________________

4. Name as many things as you can that the Mbuti make. __________________________________________________________

5. The Mbuti depend on ____________________________ for all their needs.

6. Besides the animals that are hunted, what other foods do the Mbuti find in the jungle? (Name as many as you can remember) __________________________________________________________

7. One main activity of the Mbuti is ____________________________
Appendix I

Scoring Templates and Answer Keys for Short Answer Tests
Grade 7 Short Answer Test - Answer Key

<table>
<thead>
<tr>
<th>Question</th>
<th>Correct Answer</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>the (Ituri) (rain) forest trees</td>
<td>2 2</td>
</tr>
<tr>
<td>2.</td>
<td>hunting, (to hunt)</td>
<td>2 2</td>
</tr>
<tr>
<td>5.</td>
<td>nets (netting) bow and arrow ditch (dig pit traps)</td>
<td>1 1 1</td>
</tr>
<tr>
<td>6.</td>
<td>they have few possessions</td>
<td>2 2</td>
</tr>
<tr>
<td>7.</td>
<td>clothing, necklaces, armbands, bows, arrows, dye, spears, nets, baskets, tools, huts (shelter) (houses), salt *</td>
<td>11 - 12</td>
</tr>
</tbody>
</table>

* only award one point for each of these

Maximum Total Possible: 41
## Grade 5 Short Answer Test - Answer Key

<table>
<thead>
<tr>
<th>Question</th>
<th>Correct Answer</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>(Western) Ukrain(e) Ukrainian, Ukrainia</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>hire a teacher build a school</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Ukrainian</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>shy, embarrassed lonely, alone, left out bewildered, confused</td>
<td>1</td>
</tr>
<tr>
<td>5.</td>
<td>school building different school had only one room &gt; 8 or 9 grades (classes) in one room different clothing (clothes) only one teacher different desks different subjects, (games) school was only held in winter long distance to walk to school teachers slept in people’s houses most of the children were Ukrainian</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>sang songs sang Ukrainian and (Canadian) songs recited (said) tongue twisters sang &quot;Maple Leaf Forever&quot; sang &quot;God Save the King&quot;</td>
<td>1</td>
</tr>
</tbody>
</table>

Maximum Total Possible: 24