A STUDY OF THE RELATIONSHIP BETWEEN VISUAL IMAGERY AND READING COMPREHENSION OF THIRD AND SIXTH GRADE CHILDREN

By

BRUCE LEON LUTZ II

Bachelor of Science in Business
Emporia State University
Emporia, Kansas
1969

Master of Science
Pittsburg State University
Pittsburg, Kansas
1972

Submitted to the Faculty of the Graduate College
of the Oklahoma State University
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Thesis Approved:

Paul G. Warden
Thesis Adviser

Darrel D. Ray

Norma Jo Campbell

John W. Otey

Norman N. Durham
Dean of the Graduate College

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CHAPTER I

INTRODUCTION

The notion of mental imagery has long played a central role in psychologists' and philosophers' account of the cognitive representations of the mind. In recent years of investigating imagery, the greatest amount of new interest has been in the area of studying thinking and learning, that is, cognitive psychology (Neisser, 1967). A specialized focus of study in the resurgence in the use of imagery in psychological research has been in the area of visual imagery and its effects on learning and memory.

Imagery researchers have developed strategies of teaching individuals to use visual imagery when working on tasks which involve learning and memory. The previous research efforts have suggested that the use of visual imagery strategies does enhance subjects' performance on a variety of experimenter developed learning tasks.

It is well documented in the research (Bower, 1970; Neisser, 1967; Paivio, 1971; Pressley, 1977) that the use of visual imagery strategies has facilitated subjects' performance on paired-associate learning, verbal discrimination learning, recognition memory, free recall. Visual imagery strategies have also been used to enhance learning on prose learning tasks which are more complex than the basic memory tasks listed above. Based on prose learning research until 1970, Samuels (1970) concluded that pictures did not aid children's

prose learning; however, research conducted since 1970 indicates that this conclusion must be altered (Guttmann, Levin and Pressley, 1977; Lesgold, McCormick and Golinkoff, 1975; Pressley, 1976; Shimron, 1974). As of the present, the evidence is not conclusive but does suggest that pictures aid young children in learning prose. As children get older, they are more able to generate internal visual images of the prose in order to aid their learning.

None of the studies reviewed to date has investigated the nature of the relationship between visual imagery and specific aspects of reading comprehension. Since the use and aim of much of the research lies in the area of educational application, it appears the exploration of the relationship between visual imagery and reading comprehension is needed. At the present, it is not known if visual imagery ability is related to specific types of reading comprehension or whether the use of visual imagery in reading situations will enhance specific types of comprehension. More knowledge regarding the imagery-comprehension relationship could be useful in guiding further research as well as providing a clearer picture regarding classroom use of visual imagery.

Several of the studies reviewed (Guttmann, Levin and Pressley, 1977; Kulhavy and Swenson, 1975; Lesgold, McCormick and Golinkoff, 1975; Shimron, 1974) have indicated that at different ages only specific types of visual imagery strategies are effective in facilitation of prose learning. Since the studies have not investigated the specific nature of the relationship between visual imagery and reading comprehension, the question of whether visual imagery ability

varies with age in regards to its relationship to reading comprehension has also not been explored. If visual imagery ability varies with the age of subjects in regards to its relationship to comprehension, application of different specific types of visual imagery strategies at different age levels might be necessary for facilitative effects.

Some of the early studies in the use of visual imagery strategies in prose learning situations suggest that visual imagery strategies may not have the same effects on different types of populations (Levin, 1973; Levin, Divine-Hawkins, Kerst and Guttmann, 1974; Rohwer and Matz, 1975). In these studies, disadvantaged readers were compared to ones considered more advantaged, students who learned relatively better from pictures were compared to ones who learned better from words, and readers who were considered to have poor reading comprehension but good prerequisite reading skills were compared to ones who had poor prerequisite reading skills and poor comprehension. None of the studies measured the relationship of visual imagery and specific types of comprehension with the effect of word recognition and word meaning skills controlled. As in the case with age differences in regards to visual imagery ability, the differences in word recognition and word meaning levels may have a varying effect on the facilitation of visual imagery strategies used in reading. Children with deficits in word recognition and word meaning areas may not benefit from the use of visual imagery strategies or may not benefit from good abilities in visual imagery as compared to children with these word skills.

In summary, there is a long history of research and investigations in the area of imagery. When dealing specifically with visual imagery, much of the current research is in the area of cognitive psychology. Although the facilitative effects of visual imagery on different types of learning and memory are being explored, there has not been an effort to specifically investigate the relationships between visual imagery ability and different aspects of reading comprehension. Since there is evidence that the facilitative effects of visual imagery varies with the age level of subjects, it appears worthwhile to include the variable of age.

Statement of the Problem

A review of past imagery research indicates that visual imagery strategies can facilitate learning of prose materials, however, there has not been an effort to explore what the relationship between visual imagery and prose learning is. Due to inconsistent results in previous empirical studies regarding the use of visual imagery in the facilitation of learning prose, especially with various age groups and with groups of children displaying different levels of skills in reading, the investigation of visual imagery and reading comprehension relationships should be advanced. Studies of visual imagery ability in children have not been reported in the research with regards to the relationship of visual imagery and specific types of reading comprehension. With knowledge gained by studying the visual imagery ability-reading comprehension relationship, further research can be better directed and specified. Also, further information will

be available to educators who are presently using or planning to use visual imagery to enhance reading comprehension.

Significance of the Study

Additional information about the relationship between visual imagery and reading comprehension areas can help guide further research efforts toward studying the specific areas of comprehension which are shown to be related to visual imagery. The present study will hopefully add to the understanding of the relationship between visual imagery and reading comprehension. With the use of different age groups, possibly knowledge can be gained regarding the developmental nature of visual imagery and its relationship to reading comprehension.

Until the 1970's, imagery researchers could only speculate about the effects of imagery on learning. Since that time, there has been much more data regarding these effects, and the implications for educators has increased tremendously. With more of an understanding about the relationship of visual imagery and reading comprehension, future application of visual imagery strategies in reading instruction can be more specifically applied. The present study can be related to the use of such strategies in the elementary curriculum and possibly serve as a guide for investigating the development of materials. Also, with the emphasis in present day education on serving the individual needs of students, additional information regarding the use of visual imagery for those students experiencing specific reading difficulties can be helpful.

Purpose of the Study

The basic purpose of the study is to investigate the relationships between visual imagery and specific types of reading comprehension. A second purpose of the present study is to investigate the difference between the visual imagery abilities of third and sixth grade elementary children.

Definitions of Terms

Comprehension:

Comprehension is a subject's performance on any specific comprehension tests of the New Developmental Reading Tests (Bond, Balow and Hoyt, 1968).

Imposed Visual Imagery:

Imposed visual imagery is a strategy in which the experimenter provides visual stimuli, e.g., pictures or partial pictures, to aid learning.

Induced Visual Imagery:

Induced visual imagery is a strategy in which the experimenter instructs the subject to construct internal visual images to depict words, sentences, passages or stories in order to aid learning.

Visual Imagery:

Visual imagery is a construct used to describe a person's ability to internally represent a physical stimulus in absence of the stimulus. The author's descriptive definition of visual imagery is as follows: A subjective experience which is similar enough

to actual sensory or perceptual processes to be discussed in sensory or perceptual terms. Visual imagery occurs in the absence of stimuli normally needed to produce its sensory or perceptual counterpart.

In this study visual imagery ability is measured on the Vividness of Visual Imagery Questionnaire (Marks, 1973a).

Hypotheses

The purpose of the present study is to investigate the relationship between visual imagery and specific aspects of reading comprehension with consideration for grade differences.

The following null hypotheses were established on the basis of this objective. The null hypotheses regarding the relationship between visual imagery and reading comprehension will be tested in two separate samples - third grade and sixth grade children. The last null hypothesis regarding differences between visual imagery abilities is in terms of comparing the third grade and sixth grade elementary children.

I. A. There is no significant relationship between reading for information and visual imagery for the third grade children.

B. There is no significant relationship between reading for information and visual imagery for the sixth grade children.

II. A. There is no significant relationship between reading for relationships and visual imagery for the third grade children.

B. There is no significant relationship between reading for relationships and visual imagery for the sixth grade children.

III. A. There is no significant relationship between reading for interpretation and visual imagery for the third grade children.

B. There is no significant relationship between reading for interpretation and visual imagery for the sixth grade children.

IV. A. There is no significant relationship between reading for appreciation and visual imagery for the third grade children.

B. There is no significant relationship between reading for appreciation and visual imagery for the sixth grade children.

V. A. There is no significant relationship between literal comprehension and visual imagery for the third grade children.

B. There is no significant relationship between literal comprehension and visual imagery for the sixth grade children.

VI. A. There is no significant relationship between creative comprehension and visual imagery for the third grade children.

B. There is no significant relationship between creative comprehension and visual imagery for the sixth grade children.

VII. A. There is no significant relationship between general comprehension and visual imagery for the third grade children.

B. There is no significant relationship between general comprehension and visual imagery for the sixth grade children.

VIII. There is no significant difference between the visual imagery abilities of third grade children and sixth grade children.

Limitations

In regards to limitations of the present study, it is important to note that generalization of the findings are to be limited by the population characteristics. Subjects for the study were drawn from a population representative of a single school district covering a limited geographical area. Educational instruction in reading was restricted to teaching by an auditory-visual approach in the school district from which subjects were selected. Due to restrictions in selections of the subjects to four of eight elementary schools in the school district, generalizations are also limited. Groups of children were tested at different time periods of the day which may have some effect on the generalization of the study and validity of the results. Any generalization of the findings should not be made without regard to the characteristics of the subjects in the study.

The most critical limitation to the study appears to be the use of the Vividness of Visual Imagery Questionnaire (Marks, 1973a): in that, there appears to be no reported validity for the instrument

beyond construct validity. In defense of the instrument selection, there are only few instruments measuring the specific area of visual imagery. Several studies in Chapter II review the measurement of the vividness of visual imagery and note the relationship of measured visual imagery ability to recall and learning.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

The focus of the literature review is on the effects of visual imagery on children's learning. A brief review of studies concerning visual memory are presented because studies of visual memory have provided a basis for visual imagery research. Research in the areas considered relevant to the present study are reviewed, including: imposed visual imagery, induced visual imagery, developmental views, individual differences and measurement of visual imagery.

Visual Memory

Throughout the 1960's, investigations of visual memory helped to provide an empirical basis for visual imagery. Previous to the research of visual memory evidence regarding visual imagery was based on self reports of visual images and introspection. A brief review of some studies indicating the existence of visual memory is presented.

Sperling (1960) provided evidence of a visual memory trace in a series of seven experiments. Sperling noted that when an array of nine random letters was shown briefly to the five practiced observers-used in his study, the individual subjects reported a maximum of four or five items correctly. Sperling was concerned to discover whether this limit was set by the number that could be perceived or the number

that could be remembered. The subjects were presented with a display of twelve random letters divided into three rows of four letters. Sperling gave the subjects an auditory cue to indicate the rows to which they were to attend. By using this partial report method versus having subjects view the entire display, the subjects were able to recall nine of the twelve letters. Sperling attributed his results to a visual memory trace with a relatively large storage capacity and a short duration.

In an experiment in which reaction-time techniques were used to study the retention of a single letter, Posner and Keele (1967) provided evidence of short term visual memory. Twelve male subjects were shown a letter (e.g., A) followed by a second letter after a delay ranging from 0 to 2 seconds. The subject was required to decide whether the second letter had the same name as the first letter or was different. It was discovered that after short delays physically identical letters (A-A) gave rise to faster responses than physically different ones (A-a). Posner and Keele concluded that the stored representation must preserve something of the visual aspect of the letter. By using a reaction-time design Posner, Boies, Eichelman and Taylor (1969) demonstrated that the 12 subjects in their study could use a letter name to generate a visual code or image and use this to facilitate subsequent letter recognition.

Evidence for a visual component in long term storage came from studies such as Shepard's (1967), who compared recognition memory for pictures, words and sentences and found there was recognition of each after a delay long enough not to be considered a function of short term storage. In the experiment using pictures, thirty-four

adult subjects looked through a series of 612 colored pictures. The subjects did this by looking at each stimulus at their own rate and then each subject was presented a test series of 68 pairs of pictures each of which contained one new stimulus (not previously presented) and one old stimulus (already presented in the first series). The task was to indicate which of the stimuli the subject recognized as the old one. One-half of the subjects were divided into four groups which were presented the test series after delays of 2 hours and 3, 7 and 120 days. The mean percent of correct responses was 99.7, 92, 87 and 57.7 for the respective delays. Shepard used these results to support the concept of long term visual memory storage.

With the empirical basis for the existence of long and short term visual memory established by such studies as those cited above, research has been initiated to explore the relationship of visual memory to learning and memory tasks. For an example, Guthrie and Goldberg (1972) found a significant relationship between visual memory and reading achievement. Guthrie and Goldberg (1972) investigated the relationship between visual sequential memory and reading in 81 normal and 43 disabled readers. The children had normal intelligence and a mean reading grade of 2.5. The mean chronological age of the normals was 8.5 years and the mean of the disabled was 10.3. The Benton Visual Retention Test, the Visual Sequential Memory Subtest of the Illinois Test of Psycholinguistic Abilities and the Knox Cube Test were used as tests of visual sequential memory. Reading tests included the Gray Oral Test, the Wide Range Achievement Test and the Metropolitan Reading Achievement Test. The primary outcome of the

study was that tests of visual sequential memory were significantly correlated with several measures of reading.

The support of studies such as those cited above for the existence of visual memory helped provide an impetus in the research of visual imagery as a factor to be considered in cognitive psychology. During the latter part of the 1960's and during the 1970's, visual imagery has been investigated in regards to its relationship to performance on a variety of learning and memory tasks. The research relevant to the present study is reviewed in the following sections.

Imposed Visual Imagery

Basic to the visual imagery literature is the use of imposed visual imagery strategies in learning. Provision of pictures, such as noted in the imposed visual imagery studies, is regarded as an organizational device that is imposed on the learner as distinct from induced visual imagery strategies in which subjects are instructed to construct visual images corresponding to word pairs or stories. The following is a discussion regarding the effects of imposed visual imagery on basic memory tasks as well as on more complex ones such as prose learning. The investigations of visual imagery and prose learning as presented in the next three sections are relevant to the present research study because the performance measures in the prose learning studies are ones of oral or reading comprehension.

Much of the early work in the investigation of imposed visual imagery effects on learning was done with paired-associate tasks. In one experiment completed by Levin, Divine-Hawkins, Kerst and

Guttmann (1974), it was found that children learned picture pairs more easily than word pairs. In the Levin et al. (1974) study, 43 fourth grade subjects were presented with pairs of picture and pairs of words. The subjects were then tested by presenting the stimulus item of each pair with the subjects required to supply the missing response item. Pictures led to superior learning for almost all subjects. Reese (1970) discovered that preschool children performed better than controls if presented a pictorial elaboration of stimulus and response items on a paired-associate task. Seventy-one nursery school children ranging in age from 40 to 64 months were used in the study. Reese presented stimulus and response paired-associates either pictorially or orally. Elaboration consisted of either presenting a picture of the interaction or providing a sentence describing the interaction of the pairs. The control group was only given the names of the stimulus and response items. Both the imagery and verbal context groups performed significantly better than the control group.

In another study, Levin, Rohwer and Cleary (1971) attempted to discover whether children could be classified as learning relatively better from pictures than words or better from words than pictures. On a paired-associate task using pictures and words (names of objects) the investigators tested the recall of 288 elementary aged subjects. The difference between each subject's performance on the picture pairs and the verbal pairs was noted. High picture versus verbal subjects (High P-V Types) included all subjects for whom the difference, P-V, was above the median of their reference sample, while Low P-V Types consisted of subjects whose P-V differences were below the median. The classified group consisted of 84 kindergarten, 83 first grade and

82 third grade subjects. Subjects were then tested on another pair-associate task involving both picture and verbal pairs. The results of the study suggested that those children classified as learning relatively better from pictures than words (High P-V) recalled more pictorial items than did Low P-V Types who recalled more verbal pairs. The researchers suggested that classification of children on the basis of the relative performance on pictorial versus verbal items could be useful in the selection of learning materials which best match the student's learning preference.

The studies by Levin et al. (1974), Reese (1970) and Levin et al. (1971) demonstrate that imposed visual imagery can facilitate children's performance on basic memory and learning tasks. However, a question remains of whether imposed visual imagery can enhance more complex learning such as prose learning. It is important to explore the effects of imposed visual imagery on the more complex types of learning because several researchers, such as Rohwer (1970), have recommended the use of pictorial elaboration to aide in classroom learning based on the results of paired-associate studies such as those cited above.

Beyond the indications of the positive effects of imposed visual imagery on paired-associate learning, research has been presented indicating that imposed visual imagery is facilitative in prose learning.

Lesgold, Levin, Shimron and Guttmann (1975) wished to determine whether children were able to improve their prose learning through overt construction of pictorial mediators. Improvement of learning through the use of pictures on associative learning tasks had been indicated by the results of other studies; but previous work had not

indicated the effect of imposed visual imagery on more complex learning. In the experiment 48 first grade subjects were used, 12 per condition. Each child had heard three stories. After each story the picture-after subjects illustrated the story with background and cutouts. The control-after group colored in geometric forms. Picture-during and control-during subjects either illustrated with cutouts (picture-during) or colored in one geometric form (control-during) after each sentence heard. The picture subjects received only the correct background and only those cutouts needed to illustrate the just presented sentence (picture-during) or passage (picture-after). After hearing all the stories the child was asked to recall everything he could remember from each story given the title as a cue. Also five shortanswer questions were asked about each story. In a variation of this experiment, a second study was completed in which the subjects in the picture condition watched the experimenter construct the picture. The results of the investigation indicated that the imposed visual imagery facilitated oral prose learning, but correct visualizations had to be provided or completed by the experimenters. Shimron (1974) attempted to find out if first and fourth grade children could benefit from visual imagery strategies on the comprehension of stories. He found that the first and fourth grade subjects who had illustrations of a story provided by the experimenter or who viewed the elements of an appropriate picture (with the elements arranged in a random order) answered more short-answer questions about the story they heard than control subjects.

Guttmann, Levin and Pressley (1977) conducted an investigation to show that younger children could benefit from imposed imagery but

not induced imagery and older children could benefit from induced as well as imposed visual imagery. Kindergarten, second and third-grade children were selected for the study. Eighty children from each grade were randomly assigned to one of the four experimental conditions. The researchers read stories to the children and presented either sets of pictures that fully illustrated the content of the stories (imposed visual imagery condition), sets of pictures which illustrated the story but left out any information contained in the questions (partial picture condition) or no pictures (one-half using internal imagery instructions and one-half with no imagery instructions). Kindergarteners learned more when presented with pictures illustrating the story. Second graders were able to take some advantage of partial pictures, however, only performed better with the imposed imagery condition. Third grade subjects performed better with all three strategies -- pictures, partial pictures and internal visual imagery -- than did control subjects on memory of the stories.

A note of caution in the use of imposed visual imagery has been suggested by Peeck (1974). Peeck showed that if pictures depict information contradictory to that presented in the text, children's memory for text dropped. In the study, 71 fourth graders read a story. In the experimental condition (text with illustration), the picture and text provided some information that was contradictory. On testing for retention, the experimental condition produced higher scores than the control (text not illustrated) for questions concerning only pictorial information and for questions about correctly illustrated text. On questions about the stories with contradictory pictures the experimental group selected more multiple-choice questions representing

picture input while control subjects selected alternatives representing textual input.

An additional warning about the use of imposed imagery is suggested by the research of Goldberg (1974). In his study, Goldberg presented two groups of 108 fifth-grade children with illustrated or nonillustrated incidental information that served as content material for a spelling and a grammar exercise. The purpose of the study was to determine whether imposed visual imagery had the same enhancing effects in the classroom upon incidental learning as that found in intentional learning. Goldberg found that the incidental-learning test performance of good and poor readers was facilitated by illustration. The good readers retained more incidental learning than the poor readers. Goldberg's results suggest that illustration of text may be facilitative but as in the case with Peeck's (1974) findings, the pictures accompanying the text should not present conflicting information.

The studies presented within this section suggest that pictures do aid children's learning of prose materials. It appears that younger children benefit from imposed visual imagery strategies; however, it is not until they are older that they can benefit from induced or internal visual imagery strategies. The following section will address the area of induced imagery strategies and their effects on prose learning with a consideration for the differential effects of age.

Induced Visual Imagery and Learning

In the previous section, it was noted that imposed visual imagery facilitates prose learning in elementary aged children. These studies of the effects of imposed visual imagery on learning establish a basic link to the studies on induced visual imagery. If externally imposed visual imagery (pictures) can facilitate learning, what about internal visual representations? In reviewing studies pertaining to this question, another arises at the same time. At what ages do the internal visual imagery strategies become effective in regard to improvement in learning? The following section reviews the facilitative effects of induced visual imagery on learning and suggests ages at which time the use of these strategies appear to be appropriate.

It is of interest to note that in paired-associate learning investigations, it has been established that induced visual imagery strategies are facilitative to learning in children. Between the ages of five and ten, increases in the benefits of using induced visual imagery instructions on paired-associate learning tasks have been noted. Levin, Davidson, Wolff and Citron (1973) conducted an investigation to show that younger as well as older children could benefit from an induced visual imagery strategy on associative learning. Sixty-four subjects from each of two grades (second and fifth) were given a mixed list of word and picture paired associates to learn under one of four instructional conditions: regular, sentence generation, imagery generation or joint imagery-sentence generation. In both grades, it was discovered that the children either recalled or recognized the correct response to about the same extent. Pressley

and Levin (1977) found similar results when investigating the use of induced visual imagery strategies for enhancement of paired-associate learning in a group of 52 second and 52 sixth grade students.

In another paired-associate task, Levin, McCabe and Bender (1975) found that 30 four-year-old subjects could not benefit from instructions to form an internal visual image of toys presented as stimulus and response pairs. In an attempt to discover whether feedback could be helpful in the use of induced visual imagery for learning on a paired-associate task, Yuille and Catchpole (1973) conducted a study using 38 kindergarten subjects. The finding was that children at ages five and six could benefit on a paired-associate task if instructed to form a visual image of the objects then given pictorial feedback about what constituted a good visual image.

The studies cited above in the area of induced visual imagery and paired-associate learning were presented to demonstrate the developmented trends in the use of induced visual imagery strategies and the need for feedback.

It is not until about third grade that children can successfully employ a visual imagery strategy (instructions to construct images of passage heard) to improve prose learning unless special techniques are used such as pictures or partial pictures (Guttmann, Levin and Pressley, 1977; Shimron, 1974). In the Guttmann et al. (1977) study, as reviewed in the previous section, it will be remembered that third grade subjects, but not kindergarten or second graders, benefited from an induced visual strategy. Guttmann et al. (1977) demonstrated that the period between five and eight years of age is important in the development of imaginal mediation of prose learning. Although the

five year olds could take advantage of an imposed visual imagery strategy, the third graders could improve their prose learning by an induced visual imagery strategy. Shimron's (1974) investigation indicated the same trend with first and fourth grade subjects.

Lesgold, Levin, Shimron and Guttmann (1975) speculated that the lag in age between paired-associate and prose learning in children's ability to employ imagery strategies may be due to the additional requirement of keeping track of the theme of the story including the intersentence relationships. There has been speculation that the greater effectiveness of visual imagery strategies in the older versus the younger children is possibly due to educational rather than developmental variables. Levin and Pressley (1978) conducted an investigation to demonstrate that the effectiveness of visual imagery strategies was due to developmental variables versus educational ones. Separate samples of kindergarten children (60 children in fall testing and 65 children in spring testing) were administered a paired-associate task at the beginning and end of the school year. Subjects were given either regular (control) or self-generated visual imagery instructions. It was found that age predicted paired-associate learning performance in the imagery condition whenever the ability of the subjects and amount of their schooling were controlled. This study supports the view that there is a developmental difference in the ability to employ induced visual imagery strategies for learning.

Although there has been evidence that older children can create images corresponding to stories they hear, creating visual images for materials they read appears to be more difficult. Levin and Divine-Hawkins (1974) reasoned that even though visual imagery may be

facilitative of comprehension, it may not be as effective as a reading comprehension strategy since reading requires processing of visual information. Forty-eight fourth graders were assigned to one of four conditions: reading-no imagery, reading-imagery, listening-no imagery and listening-imagery in the Levin and Divine-Hawkins (1974) study. One-half of the subjects listened to a story and one-half read the story. The findings revealed that the children who were told to construct visual images to correspond to a story they heard answered more short-answer questions about the story than controls who were not instructed to image. The visual imagery instructions did not improve the performance of the fourth graders who read the story.

With training, it appears that induced visual imagery instructions are facilitative for memory of stories read. There are, however, conflicts regarding how much and what type of training is necessary for the visual imagery strategies to be effective. Lesgold, McCormick and Golinkoff (1975) had 10 third and 22 fourth grade children draw cartoons illustrating stories they read. Children in the visual imagery condition recalled no more of the stories than control subjects. In order to determine whether the children could be trained to use visual imagery to facilitate prose learning, Lesgold et al. (1975) trained third and fourth grade children in the construction of adequate pictorial representations of the stories read. The training took several weeks, with the cartooning being phased out until the children were constructing internal visual images. These children trained to use visual imagery remembered more of a story they read than control subjects who had training but not in visual imagery.

Pressley (1976) demonstrated that the training necessary to prepare eight year olds to use visual imagery need not be as lengthy as the four weeks of training provided in the Lesgold et al. (1975) study. Pressley (1976) gave 43 third grade children, assigned to the experimental condition, practice at forming visual images and gave them feedback about the adequacy of their visual images by showing them examples of good visual images. The training only took 20 minutes. The children in the experimental group read a story after training. Imagery subjects were then instructed to make visual images of the story's content. The 43 children assigned to the control group were simply told to do what was needed to help them remember the story. The imagery subjects outperformed the control subjects.

Some evidence has been provided suggesting that imagery training is not necessary with older children (Kulhavy and Swenson, 1975; Rasco, Tennyson and Boutwell, 1975). In the Kulhavy and Swenson (1975) study, 119 fifth and sixth grade children were used with one-half the children instructed to construct visual images while they read a 20-paragraph text and one-half the subjects simply told to read the story carefully. The instructions to use visual imagery did not significantly affect performance on an immediate posttest on text related questions, but imagery subjects did recall significantly more than control subjects on a test given one week later. In the Rasco et al. (1975) study, 93 fourth and fifth grade children read passages with one of four experimental conditions: 1) passages with illustrations and instructions to use pictures to help form visual passages corresponding to the passage (Strategy-Drawing); 2) passages with no illustration but instruction to form visual images (Strategy-No

Drawing); 3) passages with illustrations but no instructions to form mental images (No Strategy-Drawing); and 4) instructions to read text and try to remember it (No Strategy-No Drawing). Both the visual imagery strategy and provisions of pictures increased the performance of the children on a posttest covering the passage read.

The studies reviewed within this section indicate that induced visual imagery strategies can improve prose learning, but the demonstrated effects on performance have been relatively small as compared to control groups. For example, in the Pressley (1976) study, imagery accounted for only 6% of the variance and in the Lesgold, McCormick and Golinkoff (1975) study, imagery subjects recalled only 13% more of the story than control subjects.

Based upon the results of the investigations cited within this section, the following points can be made:

1. The use of induced visual imagery strategies is effective in paired-associate learning, beginning at approximately five years of age.
2. It is not until about third grade that children can benefit from induced visual imagery strategies on prose learning tasks.
3. It appears that some training in the use of induced visual imagery strategies is needed for it to be an effective strategy in memory of prose materials. This may not be true of older children.

Further investigation in the type and length of training used at different age levels is needed to gain a clearer picture of the effects of induced visual imagery strategies on prose learning.

Another consideration regarding the differential effects of induced visual imagery strategies on prose learning has been proposed by Levin, Divine-Hawkins, Kerst and Guttmann (1974). Levin et al. (1974) suggests that imagery instructions may be more helpful for some populations than for others and that individual differences in learning styles or types may be important to consider in imagery studies. These individual differences and their relationship to prose learning are the focus of the next section of this paper.

Visual Imagery Strategies and Individual Differences

The research on the effects of induced visual imagery strategies on prose learning indicates that these strategies are facilitative; however, there are studies which suggest that the facilitative effects may be more powerful for certain populations. The following is a review of such investigations' results and conclusions.

In a second part of the study by Levin, Divine-Hawkins, Kerst and Guttmann (1974) discussed in the section dealing with imposed visual imagery, it was found that children could be classified according to their ability to learn paired-associates presented as pictures or words. When applied to the comprehension of prose materials, the classification of the children's relative ability in the learning of pictures or words helped identify the children from whom induced visual imagery constituted an effective organizational strategy. Three groups were identified according to their ability to learn better from pictures or words: high picture-high word, high picture-low word and low picture-low word groups. Although the main effect

for imagery was not significant in this study, it was noted that the visual imagery strategy did improve the memory for prose passages with children who were classified as learning better from pictures (high picture-low word) and decreased the learning by subjects who were classified as low picture-low word learners. This study suggests that there are individual differences in children's abilities to benefit from using visual imagery strategies to enhance prose learning.

In an effort to discover whether pictorial illustration of prose passages would help in the learning of these passages as suggested by earlier paired-associate studies, Rohwer and Matz (1975) investigated the effects of imposed visual imagery on prose learning. A total of 128 fourth-grade children were used in the study. One-half of the children were white, from high-socioeconomic status (SES) families, and one-half were black from low-SES families. The subjects all listened to a story accompanied either by the printed version of the text or by a pictorial version of the story. The subjects were then asked true-false questions about the story. Performance was higher with the picture accompanying the story for both the white and black children. The effect of the picture condition was much more powerful and pronounced for the black subjects. The black children in the printed condition especially had difficulty with items requiring inference. The black children who were in the picture condition did much better on these items. Rohwer and Matz concluded that the picture condition enhanced comprehension and reduced the gap in performance between the white and black children.

Rohwer and Harris (1975) conducted a follow-up study to the one by Rohwer and Matz (1975). Eighty-four white, high-SES and 84 black,

low-SES fourth grade children were randomly assigned to one of seven groups in which a prose selection was presented either orally, by print, by illustration or by combined media. The learning of intra-sentence and intersentence relations was tested by means of true-false questions, short-answer questions and by free recall methods. It was found that in the experimental condition of pictures accompanying the oral presentation of the story, black children performed better than in the condition of oral presentation alone. This was not true for the white children in the study. It was suggested that the picture condition decreased the performance differences between advantaged and disadvantaged populations.

Research conducted by Levin (1973) indicated that some disadvantaged fourth graders benefited more than others from induced visual imagery strategies. Fifty-four fourth graders participated in the experiment. Levin (1973) identified two types of readers based on Wiener and Cromer's (1967) classification of poor readers. The two types of poor readers identified were: "deficit" poor readers - those who comprehended poorly because they were lacking in certain necessary prerequisite skills (e.g., decoding and word vocabulary); and "difference" poor readers - those who possessed the prerequisite skills but experienced comprehension problems because they did not integrate text well. A standardized test of word vocabulary and reading comprehension was given to the subjects. Deficit poor readers were classified as ones who scored poorly on both of these tests. Difference poor readers were defined by poor comprehension but good vocabulary scores. Good readers were defined by comprehension scores at or above grade level. One third of the subjects in each classification were placed

in each of three experimental conditions: 1) reading condition - subjects simply read the story; 2) picture condition - subjects read a picture sequence that told the story; and 3) reading with imagery condition - subjects read each sentence and were instructed to construct a visual image in their heads corresponding to the content of the sentence. Subjects then answered questions about the story. The imagery instructions were facilitative of performance on this task. The imagery with reading strategy was more beneficial for "difference" poor readers than "deficit" poor readers. The "difference" poor readers in the reading with imagery condition read at the same level as the good readers in the reading condition. "Deficit" poor readers did not benefit from the imagery condition.

The results of the Levin (1973) study suggests there are differential facilitation effects of visual imagery strategies with different populations. The differential effect demonstrated by Levin (1973) is similar to that noted by Rohwer and Matz (1975) in regard to imagery strategies facilitating performance for subjects who experience difficulty deriving meaning from or integrating text.

In an attempt to discover whether visual imagery strategies would aid the prose learning of educable mentally retarded children, Bender and Levin (1978) randomly assigned 96 educable mentally retardates, ages 10 to 16 years, to one of four experimental conditions which involved listening to a short story. Subjects either viewed illustrations of the story, were instructed to generate mental pictures of the story, heard each story twice, or simply listened to the story once. Only picture subjects recalled more of the story than did subjects in all other groups. Lebrato and Ellis (1974) conducted

several experiments which demonstrated that an imagery mnemonic was effective in aiding the performance of 24 adult mentally retarded subjects on a paired-associate task. The imagery mnemonic consisted of training the subjects to remember stimulus and response items on a paired-associate list by using pictures of the items. Yarney and Bowen (1972) attempted to discover whether mentally retarded subjects could use visual imagery instructions to improve their learning of paired-associates with incidental and intentional learning conditions. Forty-five educable retarded, CA 8-13 years, mean IQ - 71.3 (WISC or Stanford Binet), and 45 normal children, CA 8-13 years, mean IQ - 110.5 served as subjects in the study. Subjects were presented one of three instructional conditions: intentional imagery, incidental imagery or intentional control (no imagery). An immediate associative recall test showed both imagery conditions to be superior to the intentional control condition for the mentally retarded and normal subjects. Thus, it appears that visual imagery strategies can be effective in basic learning tasks for mentally retarded subjects, but may not be effective for enhancement of more complex learning tasks such as prose learning. Bender and Levin (1978) suggest that the complexity of generating visual images while keeping track of the theme and events of the story is too difficult for educable mentally retarded subjects. This is consistent with Lesgold, Levin, Shimron and Guttmann's (1975) speculations regarding young children's difficulty with induced visual imagery strategies used in reading.

The general conclusion based on the studies cited here is that visual imagery strategies may be only facilitative or at least maximally facilitative in the learning of prose for children who experience

specific types of reading deficits (i.e., those having good prerequisite reading skills but poor in comprehension). It is apparent that more research is needed in the area of defining the relationship of visual imagery and reading skills as well as application of visual imagery strategies to different populations of readers.

Basic to the investigation of the relationship between visual imagery and prose learning or reading comprehension is the need to distinguish between the visual imagery abilities of subjects. This is the emphasis of the next section.

Measurement of Visual Imagery

In a critical review of research of imagery ability and cognition, Ernest (1977) discusses three operational approaches to the investigation of imagery: 1) classifying imagery as an ability in which individuals differ; 2) varying the image evoking capacity of stimuli; and 3) instructing individuals to use imagery as a mediational tool in thinking. Varying the image evoking capacity of stimuli is considered in investigations on word learning. Instructing individuals to use imagery as a mediational tool was discussed in the studies on the effects of imposed and induced visual imagery strategies on paired-associate and prose learning. When considering the classification of imagery as an ability in which individuals differ, three approaches to measurement may be distinguished: self ratings, spatial tests and performance tests. Of these three approaches to measurement, self ratings consider visual imagery in particular.

Examples of the self ratings approach are Bett's (1909) Questionnaire upon Mental Imagery (QMI), Sheehan's (1967a) shortened version of the QMI, Gordon's (1949) Test of Visual Imagery Control (TVIC) and Mark's (1973a) Vividness of Visual Imagery Questionnaire (VVIQ). Bett's (1909) and Sheehan's (1967a) revision rely on ratings from several sensory modalities. The TVIC measures the ease with which individuals can control visual images. The VVIQ measures an individual's ability in vividness of visual imagery. It has been suggested by Gur and Hilgard (1975) that the VVIQ seems to require some manipulation of memory images and thus may reflect control as well as vividness. This speculation appears to have some basis in that McKelvie and Gingras (1974) found a correlation (Pearson r = .67) when testing 87 students (16 or 17 years old). This finding suggests that these two scales seem to be measuring a common ability. For the purposes of the present study, the VVIQ was selected because of its measurement of visual versus other types of imagery and because the ratings of the vividness of one's images is one systematic way of investigating visual imagery differences. Several investigations have related the vividness of images to learning and memory.

A person's ability to construct vivid internal visual images appears to be related to incidental learning, at least of concrete stimuli. This "incidental phenomenon" has been attributed to the idea that representational responses which mediate recall, such as imagery, are readily evoked by concrete but not abstract stimuli whether one intends to learn or not.

Sheehan and Neisser (1969) were interested in discovering what role visual imagery played in recall. Using 32 adult subjects who

were pre-selected for high and low imagery on the basis of performance on the QMI, the experimenters investigated whether visual imagery was related to intentional and incidental recall of block designs. In the intentional recall condition, subjects who were rated high in imagery did no better than low imagery subjects. The incidental recall condition data showed a positive correlation between rated vividness of visual imagery and accuracy of recall. Subjects reporting the best imagery were those who remembered the most designs. In a study by Sheehan (1973), independent sets of 21 adult subjects were randomly assigned to one of two learning instructions (incidental or intentional) and tests of memory (recall or recognition). A paired-associate task was presented to each of the subjects. It was hypothesized that in paired-associate recall the difference in learning between concrete and abstract noun-word pairs would be greater in the incidental as compared to the intentional learning for subjects with vivid visual imagery. Results for the 84 subjects tested showed the predicted effect for test of recall. The vivid visual image subjects recalled more noun pairs in the incidental learning condition.

In a series of experiments by Janssen (1976), he investigated the effects of high and low visual imagery subjects (as determined by scores on the QMI) on intentional and incidental learning of noun pairs in a paired-associate task. Forty-eight college students were used in the study. Results indicated that the recall of vivid visual imagers was superior to the recall of weak visual imagers in incidental learning.

In regards to the relation of vivid visual imagery ability and memory, there have been several studies supporting a positive

relationship. These studies explored whether individuals with high vivid visual imagery could perform better on memory tasks than individuals with low visual imagery ability. Sheehan (1966) examined the performance of 38 male and 47 female undergraduate college students in reconstructing from memory three geometric patterns over ten repetitions of each pattern. The subjects were identified as either vivid visual imagers or weak imagers on the basis of their scores on the QMI. The vivid visual imagers made fewer errors in the reconstruction of the geometric patterns than the weak visual imagers. In another experiment, Sheehan (1967b) hypothesized that vivid and poor imagers process visual information differently and that their styles of perception lead to differences in retentive behavior. Seventy-two subjects, who were students in college, served as subjects in the study. Subjects were judged to be vivid or poor imagers on the basis of their average score over all items on Sheehan's (1967a) shortened version of the QMI. The task involved recall of unpatterned geometric displays. The vivid imagers had significantly less difficulty in reconstructing the designs than did the weak imagers.

Marks (1973a, 1973b) investigated the relationship between visual imagery ability and recall using the VVIQ to distinguish between vivid visual imagers and poor imagers. Thirty-six college students were used in the study with 18 identified as being poor imagers and 18 identified as vivid visual imagers. Colored photographs were used as stimuli and subjects were required to answer questions about the content of the photographs after presentation. Marks found a highly significant relationship between VVIQ scores and recall accuracy. In a replication of his original study, Marks (1973b) used 16-18 year

old subjects to test the recall of vivid and poor imagers. Again, he found that vivid visual imagers answered more questions correctly about the photographs presented than the poor visual imagers. Gur and Hilgard (1975) identified ten adult subjects as good visual imagers and ten as poor visual imagers by using the VVIQ. The experimenters were interested in discovering what the difference between the two imagery ability groups would be on a task involving recall of visual information required when discriminating between altered pictures presented in pairs. Good imagers reacted faster than poor imagers.

Based on the results of the studies reviewed, it appears that a subject's ratings of the vividness of visual images can be a systematic way of studying the differences between subjects' visual imagery abilities.

Summative Statement

In the review of the literature, several important facets concerning the nature of visual imagery have been presented. Basic to the purposes of the present investigation, studies regarding the relationship of visual imagery and prose learning were discussed. It should be noted that the review of studies concerned with visual imagery and learning, especially prose learning, is related to research in the area of reading comprehension. Support of the visual imagery-memory relationships was presented because recall of information is an aspect of reading comprehension. The following is a list of some of the generalizations noted from the studies reviewed:

1. Visual imagery strategies have facilitative effects on a wide variety of learning and memory tasks.
2. Visual imagery strategies have facilitative effects on children's performance in prose learning.
3. Training in the use of imagery strategies has differential effects on the facilitation in learning.
4. The age of a child has differential effects on facilitation in learning when using visual imagery strategies.
5. Visual imagery strategies may have more powerful effects on learning when applied to groups of children who have specific types of reading difficulties. The prerequisite reading skills of an individual may have an effect on the relationship between visual imagery and reading comprehension.
6. Vividness of visual imagery is one way of studying the differences among individuals' visual imagery abilities.

CHAPTER III

METHODS AND PROCEDURES

Introduction

The literature review, as presented in the previous chapter, has established a basis for the study of visual imagery and its relationship to reading comprehension. In the present chapter, a description of the research methodology and procedures are presented. Included is a discussion of the sample and population, methodology, a description of the instruments, and information regarding treatment of the data.

Sample and Population

Subjects participating in the present investigation were drawn from the total population of 406 third grade children and 347 sixth grade children attending classes in the Ponca City, Oklahoma public schools. A total of 57 third grade children and 57 sixth grade children were used in the sample. The study was conducted during the spring semester of the 1979 school term.

Ponca City can be characterized as a predominantly white, middle class community located in north central Oklahoma. The 1970 census data indicates there were approximately 26,000 residents within Ponca City. A 1979 estimated population, as reported by the Ponca City Chamber of Commerce, is 33,350 residents. The 1970 census data

indicates that approximately 93.5% Caucasian, 3% Native American, 2.5% Black, and less than 1% "other" residents comprise the total population. The economic base consists of a major oil industry, manufacturing, agriculture, and service oriented businesses.

The public schools provided educational services to 5,566 students during the 1979 spring semester. The elementary school population was 2,741 students who attended eight "neighborhood" schools. Classes are provided on a platoon basis with approximately one-half the students at each grade level (second through sixth) attending art, music, science, library and physical education classes one-half day and a regular classroom one-half day. There were seventeen classes of third graders with an average size class of 24 students. There were sixteen classes of sixth graders with an average size class of 22 students.

Selection of Sample

For the purpose of this study, four elementary schools were randomly selected from a total of eight schools. Since there is a fairly even distribution of ethnic and different social-economic groups throughout the school system, it was felt that four elementary schools would serve as an adequate accessible population. There were a total of 208 third graders and 172 sixth graders attending the four elementary schools. Sixty third grade subjects and sixty sixth grade subjects were randomly selected from the four schools. Fifty-seven third grade subjects and fifty-seven sixth grade subjects completed the study with three students from each grade level being absent during the testing sessions. Twenty-seven male and thirty female subjects

were in the third grade group. The sixth grade group was comprised of twenty-three male and thirty-four female subjects. It was not felt that the loss of six subjects from the total sample of 120 subjects would significantly affect the results of the present study.

Instruments

In review, the specific purposes of the study are to investigate the relationship between visual imagery and specific types of reading comprehension and to determine the difference between the visual imagery abilities of third and sixth grade level children. An additional area was explored in conducting the study. The effects of word recognition and word vocabulary were controlled in the study of the visual imagery-reading comprehension relationship. Thus, three measures were necessary: 1) a measure of visual imagery ability; 2) a measure of word recognition/vocabulary ability; and 3) a measure of reading comprehension abilities.

The Vividness of Visual Imagery Questionnaire (VVIQ) (Marks, 1973a) was selected as the instrument to assess visual imagery. This instrument was selected for three primary reasons: 1) the vividness of one's visual images is one systematic way to measure visual imagery ability; 2) the VVIQ is one of the few instruments which measures visual imagery as separate from other types of mental imagery; and 3) there is research cited in Chapter II of the present study indicating that vividness of visual imagery is related to recall of information.

The Vividness of Visual Imagery Questionnaire was derived from the Questionnaire upon Mental Imagery (QMI) (Betts, (1909). The QMI

and Sheehan's (1967) revision both rely upon the ratings from several imagery areas (e.g., auditory, kinesthetic, olfactory, etc.) versus simply visual imagery ability.

There is no evidence of reliability reported in the research for children; however, a reliability study with third and sixth grade children was conducted within the context of the present study. The sample means, standard deviations and internal consistency reliabilities for the items, as estimated by coefficient alpha (Cronbach, 1970), are presented in Table V in the Appendix. The statistics for the total visual imagery score of the children used in this study were: Mean = 32.36, standard deviation = 10.23, and reliability estimate = .82 (N = 114). For adults, the VVIQ has a test-retest reliability coefficient of .74 (N = 78) and a split-half reliability coefficient of .85 (N = 150) (Johnson, 1976).

Validity is reported for the VVIQ on the premise that recall and vividness of visual imagery are both mediated to some extent by the same covert event - visual imagery - and that the VVIQ can distinguish between high and low visual imagers. Support for this premise is indicated by studies (Marks, 1973a, 1973b) on which highly significant relationships between VVIQ scores and recall accuracy were found when testing the recall of pictures of integrated scenes and unrelated objects.

The VVIQ is a 16-item rating scale which requires subjects to rate the vividness of their imagery according to four aspects of four familiar scenes. The rating scale from 1 to 5 is as follows: perfectly clear and vivid as normal vision, 1; clear and reasonably vivid, 2; moderately clear and vivid, 3; vague and dim, 4; no image

at all, you only "know" that you are thinking of the object, 5. For the specific purposes of the present study, instructions were developed by the researcher that were deemed more appropriate for elementary aged children (Appendix). The questionnaire is recommended for ages 8-80 years. Presented below is an example of a scene provided on the VVIQ and the statements to be rated.

Visualize a boat in the ocean.

Item:

1. The boat is moving swiftly over calm waters.
2. The sea becomes very rough.
3. The boat is swaying from the rough sea.
4. The sea calms. The boat now stops and drifts in the water.

For evaluation of reading comprehension and word recognition/vocabulary, the New Developmental Reading Tests was selected. The New Developmental Reading Tests was selected because it provides measurement of seven areas in reading comprehension and includes a test of basic reading vocabulary. It is a group administered test. Five part scores and two sum scores are provided which reflect different aspects of reading comprehension. A total score (not including the test of basic reading vocabulary) yields a measurement of general reading comprehension. Percentile ranks and stannines are provided in the manual for raw scores of examinees at the end of grade 3 and at the middle and at the end of grades 4, 5 and 6. Grade scores ranging from 2.7 to 11.2 are also given.

The seven areas of reading comprehension and the basic reading vocabulary test are described below:

1. Reading for information - measures the ability of the child to gain the information specifically stated in a reading selection.
2. Reading for relationships - measures the ability of the child to comprehend the organization, grouping and association of ideas explicitly stated in a selection.
3. Reading for interpretation - measures a creative level of reading comprehension that requires the child to reflect, infer, conclude, predict and judge critically.
4. Reading for appreciation - measures a literary understanding of the selection which involves an awareness of the sensory experiences, feeling tone, motivations and descriptiveness of the story.
5. Literal comprehension - The score in this area is a sum of the scores on the reading for information and reading for relationships tests. This reflects the ability of the child to read what is specifically presented in the selection with literal understanding.
6. Creative comprehension - The score in this area is the sum of the scores on the reading for interpretation and reading for appreciation tests. Creative comprehension measures the child's ability to read imaginatively and creatively.
7. General comprehension - This is a total score of the four subtest scores and measures an overall ability of the child to understand what he reads.

8. Basic reading vocabulary - This subtest measures the ability of the child to recognize increasingly difficult words and his ability to attach meaning to those words.

The sample used for standardization was obtained through fifteen testing centers located in seven major geographic areas of the continental United States. Over 100 schools were included in the sample and community type, size and socio-economic level were taken into account in constructing the normative samples. The number of students used was 15,000.

Approximately 200 students at each grade level took both forms of the test yielding intercorrelation coefficients ranging from .79 to .89. The internal consistency reliability coefficients for each part of the test were determined by using the scores of approximately 350 students at each grade level. The internal reliability coefficients range from .83 to .94.

Various types of validity are reported for this instrument in the manual. Content validity is based on the judgement and justification by the authors. Point-biserial correlations coefficients are provided in the manual as support for item validity. The authors state that the New Developmental Reading Tests has construct validity as based on the grade equivalent norms showing that pupils at each successive grade level achieve successively higher scores on each part of the test.

Procedures

Testing of subjects with the VVIQ was accomplished in quiet, isolated rooms within each of the four schools. The VVIQ was

administered to all subjects in groups comprised of three to five individuals. All testing with the VVIQ was completed prior to administration of the New Developmental Reading Tests and was done over a two week period of time. Subjects were taken from their regular classrooms, thus, subjects who attended the regular classroom during the mornings were administered the VVIQ during the morning session and subjects attending the regular classroom during the afternoons were tested during that time.

All subjects were administered the New Developmental Reading Tests in quiet isolated rooms within each of the four schools over a period of two weeks which followed the two week administration of the VVIQ. As in the case with the VVIQ testing, subjects were tested during the time they attended their regular classroom session. Subjects were tested over an 85 minute period - two separate 35 minute testing periods with a 15 minute break in between. Testing was done in groups of approximately 15 students all within the same grade level. Directions were given as provided by the test manual.

It was necessary to have another examiner administer the VVIQ and New Developmental Reading Tests to the subjects from one school. The examiner was given training in administration of both tests. Directions were given to the examiner regarding the time periods for testing of the specific groups. The investigator in this study scored all of the tests.

Treatment of the Data

In order to analyze the relationship between the VVIQ scores and the scores on the different areas of reading comprehension derived

from the New Developmental Reading Tests, the Kendall's rank order (tau) correlations (Nie, Hull, Jenkins, Sternbrenner and Bent, 1975) was computed and tested for significance at the .05 level. The reader should be cautioned that as the number of relationships are tested, the probability of finding a significant relationship by chance also increases. It is clear that when many relationships are involved the probability of committing a Type I error in the research is considerably greater than the individual alpha level used (Linton and Gallo, 1975).

The difference between the visual imagery abilities of the third grade and sixth grade children as assessed by the VVIQ was analyzed by the use of a Mann-Whitney-U-test (Nie, Hull, Jenkins, Sternbrenner and Bent, 1975) with the significance level set at the .05 level.

In order to analyze the relationships between visual imagery (VVIQ scores) and the scores on the different areas of reading comprehension (New Developmental Reading Tests), with the effect of basic reading vocabulary partialled out, the Kendall's partial-rank order (tau) correlation (Bruning and Kintz, 1977) was utilized.

The results of the above mentioned statistical analysis methods are presented in the following chapter.

A restatement of the hypotheses discussed in Chapter I is provided below with the hypotheses presented in the operational terms of the study.

I. A. There is no significant Kendall's rank order (tau) correlation between third grade children's scores on the VVIQ and scores on the reading for information test of the New Developmental Reading Tests.

B. There is no significant Kendall's rank order (tau) correlation between sixth grade children's scores on the VVIQ and scores on the reading for information test of the New Developmental Reading Tests.

II. A. There is no significant Kendall's rank order (tau) correlation between third grade children's scores on the VVIQ and scores on the reading for relationships test of the New Developmental Reading Tests.

B. There is no significant Kendall's rank order (tau) correlation between sixth grade children's scores on the VVIQ and scores on the reading for relationships test of the New Developmental Reading Tests.

III. A. There is no significant Kendall's rank order (tau) correlation between third grade children's scores on the VVIQ and scores on the reading for interpretation test of the New Developmental Reading Tests.

B. There is no significant Kendall's rank order (tau) correlation between sixth grade children's scores on the VVIQ and scores on the reading for interpretation test of the New Developmental Reading Tests.

IV. A. There is no significant Kendall's rank order (tau) correlation between third grade children's scores on the VVIQ and scores on the reading for appreciation test of the New Developmental Reading Tests.

B. There is no significant Kendall's rank order (tau) correlation between sixth grade children's scores on the VVIQ

and scores on the reading for appreciation test of the New Developmental Reading Tests.

V. A. There is no significant Kendall's rank order (tau) correlation between thirid grade children's scores on the VVIQ and scores on literal comprehension on the New Developmental Reading Tests.

B. There is no significant Kendall's rank order (tau) correlation between sixth grade children's scores on the VVIQ and scores on literal comprehension on the New Developmental Reading Tests.

VI. A. There is no significant Kendall's rank order (tau) correlation between third grade children's scores on the VVIQ and scores on creative compehension on the New Developmental Reading Tests.

B. There is no significant Kendall's rank order (tau) correlation between sixth grade children's scores on the VVIQ and scores on creative comprehension on the New Developmental Reading Tests.

VII. A. There is no significant Kendall's rank order (tau) correlation between third grade children's scores on the VVIQ and scores on general comprehension on the New Developmental Reading Tests.

B. There is no significant Kendall's rank order (tau) correlation between sixth grade children's scores on the VVIQ and scores on general comprehension on the New Developmental Reading Tests.

VIII. A. There is no significant difference between the ranks of third grade children's scores on the Vividness of Visual Imagery Questionnaire and ranks of sixth grade children's scores on the Vividness of Visual Imagery Questionnaire.

CHAPTER IV

STATISTICAL RESULTS

Introduction

The major purpose of the study was to investigate the relationship between visual imagery and specific aspects of reading comprehension. A secondary purpose of the research was to investigate the difference between the visual imagery ability of third and sixth grade students. In the statistical analysis of the data, the relationship between visual imagery and reading comprehension was explored further by controlling the effects of the basic reading vocabulary of the students. This chapter is divided into three sections in order to present a statistical analysis of the data and evaluation of the results for each of the purposes noted.

Statistical Analysis of the Data

Relationship of Visual Imagery to Reading Comprehension

In order to analyze the relationship between visual imagery as defined by scores on the Vividness of Visual Imagery Questionnaire and reading comprehension as measured by the New Developmental Reading Tests, the Kendall's rank-order (tau) correlation (Nie et al., 1975)

was used. Significance was set at the .05 level. The results of the correlations are presented in Table I for third grade children. An analysis of the results based upon the specific null hypotheses under consideration is also presented.

I. A. There is no significant relationship between reading for information and visual imagery for third grade children.

This hypothesis predicted no significant relationship between visual imagery and reading for information. As indicated in Table I, support for the rejection of the null hypothesis was indicated (tau = .21, $p < .05$).

II. A. There is no significant relationship between reading for relationships and visual imagery for third grade children.

The hypothesis in question predicted no significant relationship between the visual imagery scores and scores on the test of reading for relationships. Retention of this null hypothesis was supported as the relationship was found to be non-significant (tau = .15, $p > .05$).

III. A. There is no significant relationship between reading for interpretation and visual imagery for third grade children.

Support for rejection of this hypothesis is indicated in Table I, as the relationship was found to be significant (tau = .28, $p < .01$).

IV. A. There is no significant relationship between reading for appreciation and visual imagery for third grade children.

TABLE I

SUMMARY OF CORRELATIONS BETWEEN VIVIDNESS OF VISUAL IMAGERY QUESTIONNAIRE AND NEW DEVELOPMENTAL READING TESTS FOR THIRD GRADE STUDENTS

Reading Comprehension	Vividness of Visual Imagery	Significance Level
Reading for Information	.21	.012
Reading for Relationships	.15	.065
Reading for Interpretation	.28	.002
Reading for Appreciation	.30	.001
Literal Comprehension	.20	.015
Creative Comprehension	.31	.001
General Comprehension	.27	.002

This null hypothesis was rejected, as the relationship between visual imagery and reading for appreciation was found to be significant (tau = .30, $p < .01$).

V. A. There is no significant relationship between literal comprehension and visual imagery for third grade children.

The literal comprehension score is the total score of the reading for information and reading for relationships scores. Support for rejection of the null hypothesis is noted in Table I, which indicates that the relationship was found to be significant (tau = .20, $p < .05$).

VI. There is no significant relationship between creative comprehension and visual imagery for third grade children.

This hypothesis predicted no relationship between visual imagery and the combined scores of reading for interpretation and reading for appreciation. The null hypothesis is rejected, as indicated by Table I (tau = .31, $p < .01$).

VII. There is no significant relationship between general comprehension and visual imagery for third grade children.

The general comprehension score is the total score of all other reading comprehension scores on the New Developmental Reading Tests. This hypothesis predicted no relationship between the imagery scores and general comprehension scores. Support for rejection of the null hypothesis is shown in Table I (tau = .27, $p < .01$).

The results of the correlations between visual imagery and reading comprehension for the sixth grade group are presented in Table II and discussed below in relationship to the specific hypotheses.

TABLE II

SUMMARY OF CORRELATIONS BETWEEN VIVIDNESS OF VISUAL IMAGERY QUESTIONNAIRE AND NEW DEVELOPMENTAL READING TESTS FOR SIXTH GRADE STUDENTS

Reading Comprehension	Vividness of Visual Imagery	Significance Level
Reading for Information	.15	.061
Reading for Relationships	.23	.008
Reading for Interpretation	.06	.253
Reading for Appreciation	.12	.111
Literal Comprehension	.22	.009
Creative Comprehension	.12	.094
General Comprehension	.17	.033

I. B. There is no significant relationship between reading for information and visual imagery for sixth grade children.

As indicated in Table II, support for this null hypothesis was found (tau = .15, $p > .05$).

II. B. There is no significant relationship between reading for relationships and visual imagery for sixth grade children.

This hypothesis predicted no significant relationship between the visual imagery scores and scores on a test designed to measure a child's ability to use organization and association in comprehension. Support for rejection of the null hypothesis is indicated in Table II which shows a significant relationship between the two variables (tau = .23, $p < .01$).

III. B. There is no significant relationship between reading for interpretation and visual imagery for sixth grade children.

Reading for interpretation was found not to be significantly related to visual imagery (tau = .06, $p > .05$) as indicated in Table II and which supports acceptance of this null hypothesis.

IV. B. There is no significant relationship between reading for appreciation and visual imagery for sixth grade children.

As shown in Table II, no relationship was found (tau = .12, $p > .05$), thus, supporting the acceptance of this null hypothesis.

V. B. There is no significant relationship between literal comprehension and visual imagery for sixth grade children.

The relationship between visual imagery and literal comprehension, as indicated by Table II, was found to be significant (tau = .22, $p < .01$). This supports rejection of this null hypothesis.

VI. B. There is no significant relationship between creative comprehension and visual imagery for sixth grade children.

Support for acceptance of this null hypothesis is indicated by Table II which shows no relationship between visual imagery and creative comprehension (tau = .12, $p > .05$).

VII. B. There is no significant relationship between general comprehension and visual imagery for sixth grade children.

General comprehension was predicted to not be significantly related to visual imagery. As indicated by Table II, support for rejection of this null hypothesis is shown (tau = .17, $p < .05$).

Relationship of Third Grade Children's Visual Imagery Abilities and Sixth Grade Children's Visual Imagery Abilities

As discussed in the Methods section of this study, the relationship between the visual imagery ability of third graders and sixth graders was analyzed by use of a Mann-Whitney U test (Nie et al., 1975) with a correction for ties provided.

The hypothesis as set forth by the purpose of this study was:

VIII. There is no significant difference between the visual imagery abilities of third grade children and sixth grade children.

Statistical analysis yielded a U of 1234.5 with a Z score of 2.2124. Support for rejection of the null hypothesis was provided by the statistical analysis ($Z = 2.2124$, two-tailed $p < .05$). The mean rank of third grade students was 50.66 as compared to the mean rank of 64.34 for the sixth grade students.

Relationship Between Visual Imagery and Specific Aspects of Reading Comprehension with the Effect of Basic Reading Vocabulary Controlled

A partial rank-order correlation, using Kendall's tau (Bruning and Kintz, 1977), was completed in order to explore the relationship between visual imagery and reading comprehension with basic reading vocabulary partialled out. The partial correlations were used in the two separate grade groups. No significant test for partial rank-order tau correlations is available.

The results of the statistical analysis for the third grade group of students is presented in Table III. The correlations (taus) between visual imagery scores and the specific reading comprehension scores are presented in comparison to the correlations between these variables with basic reading vocabulary scores partialled out. As indicated by Table III, the correlations between visual imagery and each of the different aspects of reading comprehension are lowered when basic reading vocabulary is partialled out. The effect of partially out basic reading vocabulary from the imagery visual - reading comprehension correlations does not appear to lower the correlations to any major extent.

For sixth grade students, the results of the partial correlations are presented in Table IV. As in the case with the third grade students, the partial correlations are somewhat lower than the correlations between visual imagery scores and the specific reading comprehension test scores, but the discrepancy appears to be small.

TABLE III

CORRELATIONS BETWEEN VISUAL IMAGERY AND READING COMPREHENSION SCORES AS COMPARED TO CORRELATIONS OF THESE VARIABLES WITH BASIC READING VOCABULARY SCORES PARTIALLED OUT FOR THIRD GRADE STUDENTS

Reading Comprehension	Correlation with Visual Imagery	Correlation with Visual Imagery Partialling out Basic Reading Vocabulary
Reading for Information	.21	.17
Reading for Relationships	.15	.08
Reading for Interpretation	.28	.24
Reading for Appreciation	.30	.26
Literal Comprehension	.20	.15
Creative Comprehension	.31	.28
General Comprehension	.27	.24

TABLE IV

CORRELATIONS BETWEEN VISUAL IMAGERY AND READING COMPREHENSION SCORES AS COMPARED TO CORRELATIONS OF THESE VARIABLES WITH BASIC READING VOCABULARY SCORES PARTIALLED OUT FOR SIXTH GRADE STUDENTS

Reading Comprehension	Correlation with Visual Imagery	Correlation with Visual Imagery Partialling out Basic Reading Vocabulary
Reading for Information	.15	.12
Reading for Relationships	.23	.22
Reading for Interpretation	.06	.03
Reading for Appreciation	.12	.09
Literal Comprehension	.22	.21
Creative Comprehension	.12	.09
General Comprehension	.17	.15

CHAPTER V

DISCUSSION IMPLICATIONS AND RECOMMENDATIONS

Introduction

The overall purpose of the present study was to explore the relationships between visual imagery and specific aspects of reading comprehension. As discussed in Chapter II, the visual imagery research suggests that the use of visual imagery strategies can facilitate prose learning in children; however, there are few suggestions regarding the nature of the relationship between visual imagery ability and reading comprehension. There also is some confusion regarding the facilitative effects of visual imagery on learning in different age groups, in different types of readers, and in regards to the types of strategies employed. A secondary purpose of the study was to investigate the difference between the visual imagery abilities of third grade students as compared to sixth grade students, in order to better understand the relationship of visual imagery and reading comprehension with grade level considered.

The present chapter is divided into three major sections. A discussion of the findings regarding hypotheses for the primary and secondary purposes of the study are presented. In the second section, an attempt is made to integrate the findings of this study with implications for use of visual imagery in reading instruction. In the

final section a discussion of recommendations for further investigations is presented.

Discussion of Findings

In regards to the major purpose of the study, analysis of the data supports a positive relationship between visual imagery and specific areas of reading comprehension; however, the positive relationships found should be viewed cautiously. The relationship between the variables was quite low and only certain areas of reading comprehension were significantly correlated with visual imagery. These relationships were also found to be different for the two age groups. An additional caution is presented due to the awareness that when a number of relationships are tested, as was done in this study, the probability of finding a significant relationship by chance increases. In this section a discussion of the relationships found between visual imagery and reading comprehension as well as the grade level differences is presented.

For the third grade group, low positive correlations were found between visual imagery and all reading comprehension areas with the exception of reading for relationships. Significant correlations ranged from the highest being visual imagery-creative comprehension (tau = .31) to the lowest being the visual imagery-literal comprehension relationship (tau = .20). It is important to consider that the highest significant relationship between visual imagery and a specific area of reading comprehension for the third graders only accounts for 9.6% of the variance.

In the sixth grade group, significant correlations were found only between visual imagery and reading for relationships (tau = .23, $p < .01$), literal comprehension (tau = .22, $p < .01$) and general comprehension (tau = .17, $p < .05$). As in the case with the third grade group, the variance accounted for by the highest correlation is small (5.3%).

Some observations are presented regarding the relationships found between visual imagery and reading comprehension areas; however, the reader should remember that the significant relationships found were low and due to testing a number of relationships the probability of finding a significant correlation by chance increases.

In reference to the sixth graders, the literal comprehension correlation with visual imagery as well as the imagery-general comprehension correlation reflect the score of the reading for relationships subtest, thus it appears worthwhile to only discuss the reading for relationships subtest. Some previous research findings may help in exploring the relationship of visual imagery to the information tested by the reading for relationships subtest. The reading for relationships subtest of the New Developmental Reading Tests measures the ability to comprehend the organization and association of ideas explicitly stated in a reading selection. A child needs to be able to associate and group the ideas presented in a story as well as remember the specific content of the story to do well on this subtest. Several investigators, Levin (1973), Lesgold, McCormick and Golinkoff (1975) and Lesgold, Levin, Shimron and Guttmann (1975) have suggested that younger subjects (first through fourth grades) have more difficulty with the organization of ideas in a story, keeping

track of the theme of a story, and with understanding intersentence relationships than do older subjects. These researchers contend that the use of visual imagery strategies to aid in the understanding of relationships presented in a story are more effective when used with the older subjects than when used with the younger subjects. The finding that older subjects are better able to use visual imagery strategies in the understanding of relationships may be helpful in gaining some perspective about the visual imagery-reading for relationships correlation.

Significant correlations ($p < .05$) were found between visual imagery and each of the subtests of the New Developmental Reading Tests, with the exception of reading for relationships, in the third grade sample. It is suggested that, at least for third grade children, these subtest areas measure more of what visual imagery is related to in reading comprehension than does the reading for relationships subtest. The reading for information subtest requires the child to answer questions which test specific information gained. Kulhavy and Swenson (1975) suggests that the ability to experience vivid imagery facilitates the retrieval of detail or content information from memory. The other two subtests - reading for interpretation and reading for appreciation - measure the child's ability to read creatively. Reading creatively requires an ability to be reflective, sensitive to the picturesqueness of description, and to be aware of sensory impressions. The author contends that an individual's ability to visualize the scene and the characters in a story is related to that individual's ability to understand the story. For the third grade group used in the present study, the ability to

visualize (visual imagery ability) was significantly related to reading for information, reading for interpretation and reading for appreciation subtests of the New Developmental Reading Tests as well as to the combined score areas of literal, creative and general comprehension.

The results in Figure 1, indicate that visual imagery was significantly related to more specific areas of reading comprehension in the third grade group than in the sixth grade group. Two reasons are proposed to help understand why there were a greater number of significant correlations found between visual imagery and specific aspects of reading comprehension for the third graders than found for the sixth graders. First, it is suggested that the sixth grade students may use visual imagery for comprehension less than the third grade students. Levin and Devine-Hawkins (1974) and Pressley (1976) suggest that skilled readers process prose so well spontaneously that provision of imagery strategies may not greatly improve information processing. It is suggested that the sixth graders in the present study may have had more skills and experience in reading comprehension than did the third graders and did not use visual imagery to comprehend the test items as much as the third graders did. If this was the situation, visual imagery would not be related to as many comprehension areas for sixth graders as imagery would be related to specific aspects of reading comprehension for third grade students. Another related explanation of the results is that the sixth grade students may have used organizational strategies other than visual imagery to aid their comprehension of the reading material. Levin (1973) discusses the developmental aspects of comprehension strategies and sug-

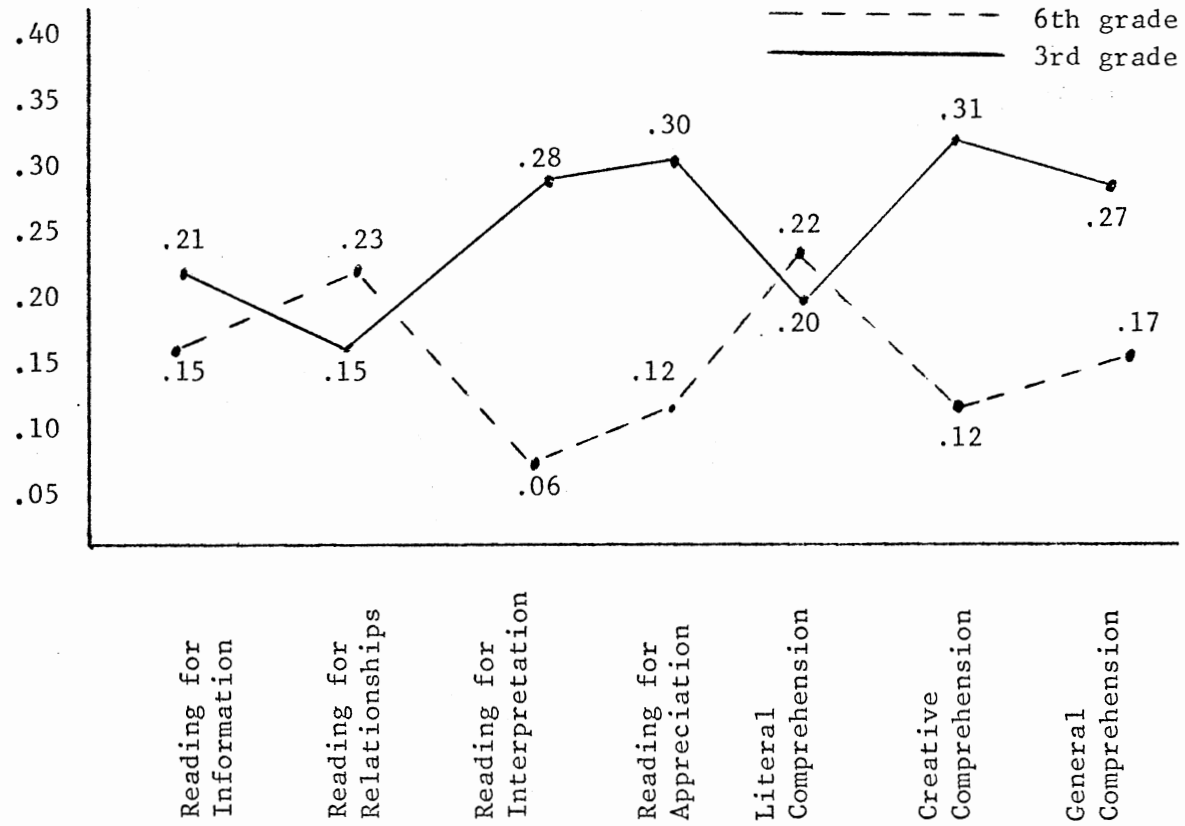

Figure 1. Correlations Between Visual Imagery Scores and Reading Comprehension Scores for Third and Sixth Grade Students

suggests that younger subjects are less likely to be able to use a variety of organizational strategies than older subjects. As suggested by Levin, older subjects may be able to use organizational strategies other than visual imagery strategies that are more suitable for comprehension of prose materials. It is contended that in the context of the present study the third grade students had to rely on a few organizational strategies, including visual imagery, in order to comprehend the materials while the sixth graders possibly used other organizational strategies more than visual imagery to comprehend the reading selections. This use of other organization strategies by the sixth grade group would tend to lower correlations between visual imagery and the specific aspects of reading comprehension.

A significant difference was found between the visual imagery abilities of third grade students as compared to sixth grade students. The sixth grade students displayed more visual imagery ability than the third graders. This finding can be best understood in relation to the findings of previous investigations of visual imagery. Guttmann, Levin and Pressley (1977) and Shimron (1974), indicate a developmental trend of younger children being able to use internal visual imagery strategies less effectively than older students. The visual imagery ability of third grade students as compared to sixth graders may follow this developmental trend. This developmental trend does not imply that the sixth graders tend to use visual imagery more than third graders only that the sixth grade students may display more visual imagery ability than the younger subjects.

The most significant finding as related to the major purpose of this study was the general trend of low positive correlations

between visual imagery abilities and specific aspects of reading comprehension. As indicated by Figure 1, visual imagery and different types of reading comprehension are related. The relationships between these two variables varies according to the grade level of the students and varies in relation to the different types of comprehension. Explanations concerning the positive relationships between visual imagery and the specific types of reading comprehension were discussed earlier in this section. Presented below is a discussion of possible factors influencing the effectiveness of visual imagery in the facilitation of reading comprehension.

Most of the studies reported in Chapter II reporting facilitative effects of visual imagery strategies on prose learning, used only a few sentences. These sentences for the most part were highly concrete and imageable (see Guttmann, Levin and Pressley, 1977; Pressley, 1976). Passages or stories found in typical classrooms may be longer, more complex and more abstract than ones used to test comprehension in the cited studies. Also, the finding of a relationship between visual imagery and reading comprehension, as found in the present investigation, may be due to the concreteness of passages used to test comprehension areas or due to the number of high imagery-evoking words used. The studies cited in Chapter II reporting the positive effects of visual imagery on prose learning, were typically designed with some type of visual imagery training provided to the subjects. Training was usually done by instructing subjects to construct images depicting the events of the story and by the experimenter providing examples of appropriate images. Based on studies such as Levin (1973), Guttmann, Levin and Pressley (1977), Lesgold, Levin, Shimron and Guttmann

(1975), the use of training and feedback appears to be necessary in order for the visual imagery strategies to be effective in prose learning. Thus, the imagery ability level of a child may not be as important as training in the use of visual imagery strategies in regards to the relationship of visual imagery and reading comprehension. If a child has a good ability to visualize the content of a story but does not spontaneously use this ability, the relationship of visual imagery ability with reading comprehension will be affected. It is suggested that it is important, as discussed in the final section, to explore the relationship between the use of visual imagery by subjects for facilitation of reading comprehension. Feedback on the appropriateness of the visual images depicting the story appears to be highly important as indicated by the finding of Peeck (1974) that presentation of conflicting information, such as in pictures, with a reading passage can decrease comprehension of prose. Although training and feedback appear to be important, it is worthwhile to note that the effects of visual imagery strategies on performance have been relatively small as compared to control groups.

Low correlations between visual imagery and reading comprehension may also be viewed from the finding that attempting to image while simultaneously reading may interfere with the reading of prose materials (Levin and Divine-Hawkins, 1974).

In reviewing the findings of the present study about the relationship between visual imagery and reading comprehension, it should be noted that the low correlations between these variables may not reflect the relationship between mental imagery and comprehension. Other types of imagery may be related to reading comprehension. This

study only focused on visual imagery ability. It is also worthwhile to indicate that tests of visual imagery other than the vividness of imagery are available, such as tests of the control of imagery and tests of spatial imagery. These tests may reflect higher correlations with reading comprehension

In summary, low positive correlations between visual imagery ability and specific aspects of reading comprehension were found in third and sixth grade students. The relationships found were specific only to certain reading comprehension areas and varied for the different grade groups. Visual imagery ability was related to more aspects of reading comprehension in the third grade group than in the sixth grade group. It was suggested that the differences between the imagery-comprehension relationships in the groups was due to the different uses of visual imagery by the groups and due to the different levels of skills in reading comprehension displayed by the groups. The finding that visual imagery abilities of sixth graders were greater than these abilities in third graders was explained as being due to developmental reasons. Training in the use of visual imagery strategies, feedback regarding the appropriateness of visual images and the simultaneous use of imagery while reading were suggested as factors possibly influencing the relationship between visual imagery and reading comprehension.

Implications for Education

Generalizations made from this study as applied to academic instruction or to use in the classroom are limited due to the nature of the study. Some implications, however, may be useful when

considering the implementation of visual imagery strategies in order to facilitate specific types of reading comprehension.

As indicated in Chapter II, there are basic inconsistencies in the findings regarding the use of visual imagery for facilitation of prose learning. Imagery research to date has not clearly established whether training in the use of visual imagery is necessary for visual imagery to aid prose learning. Research has not delineated the specific types of training subjects need in order to gain facilitative effects of visual imagery for reading comprehension. Previous research findings suggest that the age of a subject is important in relation to the use of specific strategies to aid comprehension. The age-type of strategy relationship has not been fully specified. Other research presented in Chapter II indicates that the use of visual imagery may be facilitative in reading comprehension for some types of readers but not helpful for other types of readers. The findings of the present study suggest that visual imagery is related to reading comprehension but this relationship is not a simple one. Significant relationships were found between visual imagery and specific aspects of reading comprehension in the investigation reported in this paper. Visual imagery was found to be significantly related to certain types of reading comprehension for third grade students while the imagery-comprehension relationships were different for sixth grade students. The information summarized above suggests that consistent relationships between visual imagery and different types of reading comprehension have not been established by previous research or by the current investigation. Without a better understanding of the visual imagery-comprehension relationship it would be

difficult to implement specific visual imagery strategies in the classroom and hope to gain facilitation for reading comprehension.

Other research findings add to the lack of an adequate understanding when considering the development of visual imagery strategies for classroom use. Levin (1973) suggested that visual imagery strategies may be only effective in the prose learning for students who have prerequisite reading skills but lack the ability to integrate information. It was indicated by Levin (1973) that the use of visual imagery strategies in order to aid comprehension may not be helpful to students who are good readers or ones who lack prerequisite reading skills. These findings by Levin (1973) suggest that application of visual imagery strategies in a typical classroom would be helpful only to a few students for improving reading comprehension.

As related in Chapter II, the age of the subject using visual imagery strategies for improvement of reading comprehension appears to be significant. The previous research findings indicate that older students were found to be better able to use imagery strategies to enhance prose learning. The results of the present study indicated visual imagery abilities of younger subjects (third graders) were significantly related to more specific aspects of reading comprehension than the imagery abilities of sixth grade students. It was suggested that the third graders used visual imagery more than sixth graders as an organizational strategy for comprehension of the materials read. The findings of previous research as compared to the results of the present study suggest that not only is the age of the subjects important but also the use of visual imagery by specific age groups is significant. Other studies in Chapter II

indicate that different types of visual imagery strategies were more effective for different age groups. The specific type of training or feedback in the use of visual imagery strategies to improve comprehension at the different age levels has not been established. The various findings discussed here concerning age as related to the effectiveness of visual imagery strategies in the enhancement of reading comprehension suggest that many factors have to be considered if desiring to effectively use visual imagery in reading instruction. The wide variety of the results mentioned also suggest that there are not any specified guidelines indicating the exact visual imagery strategies to use to facilitate a particular aspect of reading comprehension at a specific age level.

With the resurgence of interest in imagery research, many studies have been conducted in the area of learning and memory as related to visual imagery. At the present time, the nature of the relationship between visual imagery and reading comprehension is not well specified. The previous research findings summarized in Chapter II and the findings of the present study do not provide a clear description of the use of visual imagery for facilitation of reading comprehension. More research which relates the different age levels, to the different types of imagery training, and considers the specific type of reader as well as the specific aspects reading comprehension is needed. With the information available at the present time, it is suggested that educators not use visual imagery strategies for the specific purpose of improving reading comprehension. There is not enough information to enable the educator to use visual imagery

strategies for facilitation of reading comprehension with any type of predictability.

Recommendations for Further Research

The present study was exploratory and focused towards investigating the relationships between visual imagery and specific aspects of reading comprehension. Based upon the literature review and the discussion of the findings in this study, recommendations for further research are presented.

As discussed in the previous two sections, a precise understanding of how visual imagery is related to different types of reading comprehension has not been established in imagery research. It is recommended that further research be advanced in the study of the relationship between visual imagery and reading comprehension with consideration made for the age of subjects, sex of subjects, type of readers and specific aspect of reading comprehension being studied.

The suggestions by Levin (1973) and Rohwer and Matz (1975) that visual imagery strategies may be more effective for facilitation of prose learning with special populations (e.g., reading disabled or disadvantaged students) should be explored further in research. Various visual imagery strategies could be used with readers having different types of reading problems. Performances of these readers could be compared to control groups in order to better determine if visual imagery is useful only to certain types of readers.

Since the results of the present study suggest that younger subjects may use visual imagery as strategy in comprehension of

reading materials more than older subjects, it is proposed that further investigation of the use of visual imagery by different age groups be conducted.

In relation to the above proposal for further research, it is suggested that the use of visual imagery strategies in different age groups be compared to the use of other organizational strategies, such as verbal rehearsal in these groups. The differential effects of these organizational strategies on facilitation of reading comprehension could be explored.

Based on the inconsistencies reported in the literature concerning the exact type of training necessary for visual imagery to be facilitative for prose learning, further consideration of the type of training and type of feedback needed by subjects is appropriate. Consideration of age, sex and different types of readers would be helpful in this investigation. Also, studies that can lead to a better understanding of the different comprehension areas amenable to visual imagery training appear to be needed.

The present study involved only exploration of the relationship between visual imagery and reading comprehension. Further research could be initiated which involves exploration of the relationship between other imagery abilities (e.g., auditory and kinesthetic) and reading comprehension. Other visual imagery instruments could also be used to study the imagery-reading comprehension relationship.

Finally, it is recommended that the relationship between visual imagery ability and reading comprehension be studied with the use of different types (concrete versus abstract) of reading materials.

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APPENDIX

INSTRUMENTATION: VIVIDNESS OF VISUAL IMAGERY QUESTIONNAIRE

INSTRUCTIONS FOR CHILDREN IN ADMINISTRATION

OF THE VIVIDNESS OF VISUAL IMAGERY

QUESTIONNAIRE

The following are the instructions provided by the investigator to children in the administration of the Vividness of Visual Imagery Questionnaire.

We will be doing an exercise on how well you can see different pictures in your mind. You know that when you dream you can see pictures of people and things. You can also see pictures while you are awake. Some people see these pictures very clearly and some people can only see them dimly or sometimes cannot see a picture at all. This is just another way in which we are different from one another.

There are four scenes I will describe and four descriptions about each scene I will make. As you can see on your papers, there are the numbers 1 through 16 listed on the left side of your paper. Beside each of these numbers there are five choices 1, 2, 3, 4, or 5. Please mark number 1 if the picture you see when I describe a scene is perfectly clear, like you were actually seeing what I describe. Mark number 2 if the picture you see is clear but not as clear as if it were in front of you. Mark number 3 if you see a picture of the scene but many of the details are missing or if you can't see the whole scene I describe. Mark number 4 if the picture you see is not very clear with many of the details I describe missing. Mark number 5 if you

really do not see a picture of what is described, but you just know you are thinking about the scene.

I will describe something now and would like you to mark how clearly you see what I describe. Mark 1, 2, 3, 4, or 5 to the right of the word "sample". If you forget what each number stands for look at the top of the page where each number is described.

Now lets do the sample. Please close your eyes and try to see a pink elephant taking a bath. Mark how clearly you saw this scene.

Please ask any questions you have.

Now, lets begin the exercise starting with number 1. When marking how well you saw a picture, please try to mark the number that best describes how you saw each scene.

TABLE V

INTERNAL CONSISTENCY RELIABLITY COEFFICIENTS FOR THE VIVIDNESS OF VISUAL IMAGERY QUESTIONNAIRE FOR THIRD AND SIXTH GRADE STUDENTS

Item #	Means	Standard Deviations	N
1	1.86	1.26	114
2	2.21	1.27	114
3	2.21	1.27	114
4	1.90	1.26	114
5	2.03	1.18	114
6	2.06	1.21	114
7	1.97	1.23	114
8	1.83	1.14	114
9	1.80	1.22	114
10	1.85	1.07	114
11	2.04	1.22	114
12	1.70	1.14	114
13	2.14	1.20	114
14	2.35	1.34	114
15	2.13	1.22	114
16	2.34	1.41	114

Statistics for the Scale:

Mean = 32.36

Alpha = .82

Standard Deviation = 10.23

VITA

Bruce Leon Lutz

Candidate for the Degree of

Doctor of Education

Thesis: A STUDY OF THE RELATIONSHIP BETWEEN VISUAL IMAGERY AND READING COMPREHENSION OF THIRD AND SIXTH GRADE CHILDREN

Major Field: Educational Psychology

Biographical:

Personal Data: Born in Vancouver, Washington, October 5, 1947, the son of Mr. and Mrs. Charles L. Lutz.

Education: Graduated from Valley Falls High School, Valley Falls, Kansas, in May, 1965; received Bachelor of Science in Business degree, with a major in Psychology and Business from Emporia State University, Emporia, Kansas, in May, 1969; received Master of Science degree in Psychology from Pittsburg State University, Pittsburg, Kansas, in August, 1972; completed requirements for the Doctor of Education degree at Oklahoma State University in May, 1980.

Professional Experience: Marketing Representative, Kansas Power and Light Company, Lawrence, Kansas, 1970 - August, 1971; Consulting Psychologist, Bi-State Mental Health Foundation, Ponca City, Oklahoma, August, 1972 - August, 1975; School Psychologist Intern, Bi-State Mental Health Foundation, August, 1975 - June, 1976; School Psychologist, Bi-State Mental Health Foundation, June, 1976 - August, 1977; Director of Educational Services, Bi-State Mental Health Foundation, August, 1977.