A STUDY OF THE EFFECT OF CERTAIN CURIOSITY
CONSTRUCTS AND THOUGHT PROCESSES UPON
THE RESPONSES OF BLACK SIXTH
GRADE PUPILS

Dissertation

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By

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This investigation is concerned with determining the value, if any, of certain curiosity constructs and thought skill experiences upon "raw score" responses of black sixth grade pupils to selected standardized and experimenter made tests.

The major purpose of this study is to determine whether the curiosity levels of black children will be increased and if gains will be made in reading comprehension and responses when selected questioning procedures are used. The study is confined to teacher-directed instructional situations where pupils are engaged in reading acts.

The subjects for this study are sixth grade pupils (N=176) from two self-contained classrooms of two selected elementary schools in the same district. The subjects in the study are similar in socio-economic level, cultural background, and academic achievement. The subjects participated in this experimental project for a period of 18 weeks.
The two groups were given a pre-and post-test in four instruments which served to supply data which was utilized in testing ten hypotheses designed to provide answers to three basic questions: (1) Does the use of selected questioning procedures produce a significant gain in responses to questions on selected standardized test and experimenter made tests over the use of regular classroom procedures? (2) Does the use of selected questioning procedures produce a significant gain in reading comprehension over the use of regular classroom procedures? (3) Does the use of selected questioning procedures produce a significant increase in curiosity over the use of regular classroom procedures?

The four measuring instruments used are The Stanford Achievement, Intermediate II, Reading, Forms W and X; the Otis-Lennon Mental Ability Test, Elementary II, Forms J and K; Bradley Thought Skill Test, Forms I and II; Curiosity Inventory Test, Forms I and II.

The t test is used to determine whether the means of the two groups differed significantly. A further statistical treatment is determined by employing analysis of covariance procedures.

The statistical procedures utilized to test the significance of the ten null hypotheses produced evidence that indicated that the use of selected questioning procedures advocated by Bradley and Earp increased the thought skill process of black sixth grade students.
A fourth question is posed for the study concerning the participating teachers which states: Is there any significant difference in the responses of the participating teachers on the pre-and post-Reading Inventory Test?

Findings on question four indicate that teachers, when given an opportunity to discuss, analyze and evaluate their weaknesses, can improve their responses to questions on standardized test.

On the basis of the findings made by this study the following conclusions are made: (1) that a planned program of thought skill questions may have relatively positive effect upon the responses of black sixth grade students to questions on standardized and experimenter made test than those students left in a normal school situation with no special help; (2) that teachers who are aware of the nature of the thought skill procedure demonstrate more concern about the progress of their students and include more questions in their teaching which stimulate the black student's imagination and heighten his curiosity.
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CHAPTER I

INTRODUCTION

Background of the Present Study

Recently, there has been an increasing awareness of a relationship between curiosity and psychological adjustment. Such aspects of personality as need for approval, scholastic motivation, nervous behavior, need for achievement, and social maladjustment have been studied in connection with curiosity and psychological adjustment (22, p. 24).

Berlyne, who listed several influences on curiosity, felt that it could be increased "with the number of previous opportunities to gratify it in similar circumstances." (5, p. 265). Following his publication on Conflict Arousal and Curiosity in 1960, interest in the area of human curiosity increased. Maw and Maw coordinated a study in 1964 entitled "An Exploratory Study into the Measurement of Curiosity in Elementary School Children." They gave certain pencil and paper tests of curiosity for fifth grade children. These tests were devised, validated and tested for validity by the Maws (22).

In 1969, Mays used the Maw and Maw tests in an experimental study. Commentary upon observations from the study, she suggested that "instruments for measuring curiosity in subjects younger and older than the fifth grader for whom
the Maws designed their paper and pencil tests were needed. Such instruments would permit the study of curiosity at all age levels" (22, p. 78).

Downward extensions of some of the Maws' tests were devised by Bradley and Adkisson for first and second grade students. These tests were in an experimental study by Adkisson in 1970 (2). Apparently, no curiosity test and thought skills have been devised specifically for intermediate students nor have studies been made to investigate their value and use in studying the effect upon responses of black sixth grade students to selected standardized and experimenter-made tests.

Significance of the Problem

The failure of our educational institutions to teach the "know how" of thinking cuts to the core of the raging controversy over so-called pernicious effects in our schools. There would be little problem in teaching our pupils about the many subjects of the elementary curriculum, if the pupils had learned to think curiously, comprehensively, and intellectually (26).

The skill of thinking is one of the most important skills to which a child can be exposed. A child should be able to define a problem clearly, locate, select, and organize information, evaluate evidence, weigh sources, compare points of view, make inferences, draw conclusions, generalize, accept,
reject, or hold in abeyance facts, ideas, and concepts in the consideration of a problem.

Since these skills are acquired through reading in the various subject matter areas of the elementary curriculum, a major emphasis upon the child's efforts to be curious should be during his period of class instruction in reading assignments. Frequently, teachers ask questions during the class period which only require the students to remember, and there is evidence that very few teachers utilize the full range of questions that require the students to use ideas (26).

The encouragement of students to raise questions is largely neglected in classrooms, because the students' role appears to be one of searching for an answer (26). It is significant to note that Bradley (7), Cogswell (9), Gray (16), Guszak (17), and Schoeller (28) conjectured that the end result of such conventional school practice can only be that intellectual curiosity is never truly encouraged in the schools or that it never has an opportunity to bud.

Typically, many teachers are aware of the necessity for strong development in question making, which has as its basis -- curiosity. They promote the idea that children need to be given a program in which the types of questions asked are geared to certain selected thinking processes. A program which can be used to encourage children to think and become intrinsically motivated in curiosity is sorely needed.
Supporting this premise, Hunkins states:

Questions used by teachers in their discourse and those incorporated in instrumental materials probably are significant in guiding the development of pupils' levels of knowledge and achievement. Questions reveal the operational objectives which stress for example, the increase of pupils' knowledge of facts, of understanding, of concepts, and of pupils' skill at interpreting information and ideas (19, p. 326).

Investigators like Adams (1), Aschner (3), Barr (4), Floyd (12), and Stevens (29) reveal that classroom teachers devote a major portion of their time to asking questions. The usefulness of questions, according to these investigators, has long been recognized as significant in the teaching-learning interaction. Yet, even with this purported awareness of the importance of questions, little has been done with regard to the effects questions have upon pupils' achievement within classroom situation. Herman states:

Today parents want the schools to do more than transmit the cultural heritage. They want the schools to teach their children how to recognize and state problems, to brainstorm, to collect and test data, and afterwards to draw conclusions, in short, to think (18, p. 263).

Taba states, "The development of thinking is an objective to which we pay lip service, but which we do not practice" (31, p. 215). Cogswell further emphasizes the need for a program of divergent thinking when he states that:

A course in the art of science of thinking would seem to be so necessary and valuable for individuals in particular and society in general that it should be an absolute requirement for every student. But how many schools offer such a course? I do not know one (9, p. 60).
Raths recognizes that emphasis upon thinking activities will encourage thinking and result in a decrease in what may be termed "immature" behavior (26, p. 8). Maw and Maw indicated that if the curiosity of children is to be maintained at a high level and increased, curiosity of school children must be studied (20, p. 102). Bradley and Earp (7), Mays (24), and Adkisson (2) give support to the fact that learning may be facilitated if major emphasis is placed upon the pupils' curiosity. Their concerted opinions lend credibility to the statement that children should have experiences in the schools that will help stimulate the questioning attitude (20, p. 102). No doubt such writers as these, and even earlier authors were instrumental in influencing the thinking of Maw and Maw, who suggested the following study.

The knowledge obtained about curiosity should be tried out in specific courses and in the curriculum in general, in the elementary school (20, p. 120).

According to these writers, it appears that the time has come for children to be taught how to think, and to acquire from their teachers a type of program that promotes reasoning and thinking. The innate curiosity of the child may serve as the focal point between what one is able to use as a thought skill and what one has that may be identified as an exploratory type of behavior or willingness to learn.

Consequently, as a result of information gleaned from the studies mentioned above, the investigation of this study purports to (1) investigate the effect of certain curiosity
constructs and thought skills upon the responses of black sixth grade pupils to selected standardized and experimenter made tests; (2) prepare materials for teachers using the questioning procedures suggested by Bradley and Earp with the categories expanded to twelve of the fifteen categories delineated by Raths; and (3) to determine the extent to which thinking operations as categories of questions affect curiosity and scores on achievement and intelligence test.

General Statement of the Problem

This investigation was concerned with determining the value, if any, of certain curiosity constructs and thought skill experiences upon "raw score" responses of black sixth grade pupils to selected standardized and experimenter made tests.

Purpose of the Present Study

The major purpose of this study was to determine whether the curiosity levels of black children would be increased and if gains would be made in reading comprehension and responses when selected questioning procedures were used. The study was confined to teacher-directed instructional situations where students were engaged in reading acts.

More specifically, answers were sought to the following questions:
1. Does the use of selected questioning procedures produce a significant gain in responses to questions on selected standardized test and experimenter-made tests over the use of regular classroom procedures?

2. Does the use of selected questioning procedures produce a significant gain in reading comprehension over the use of regular classroom procedures?

3. Does the use of selected questioning procedures produce a significant increase in curiosity over the use of regular classroom procedures?

4. Is there any significant difference in the responses of the participating teachers on the pre- and post-

Statement of Hypotheses

The present study tested the hypothesis that the use of high level questioning will have an effect upon the curiosity levels and thinking processes of black sixth grade students and produce gains in reading achievement and in responses to selected standardized and experimenter-made tests. Specifically, the following hypotheses were tested.

1. There will be no significant difference between the mean score in responses to questions on the pre-test in Word Meaning on the Stanford Achievement Reading Test, Intermediate II, Form W, made by Group I, Experimental, and Group II, Control.

2. There will be no significant difference between the mean score in responses to questions on the post-test in Word
3. There will be no significant difference between the mean score in responses to questions on the pre-test in Paragraph Meaning on the Stanford Achievement Reading Test, Intermediate II, Form W, made by Group I, Experimental, and Group II, Control.

4. There will be no significant difference between the mean score in responses to questions on the post-test in Paragraph Meaning on the Stanford Achievement Reading Test, Intermediate II, Form X, made by Group I, Experimental, and Group II, Control.

5. There will be no significant difference between the mean score of Group I, Experimental, before administration of the experimental program, and the mean test score of Group II, Control, as determined from the Otis-Lennon Mental Ability Test, Form J.

6. There will be no significant difference between the mean score of Group I, Experimental, after administration of the experimental program, and the mean test score of Group II, Control, as determined from the Otis-Lennon Mental Ability Test, Form K.

7. There will be no significant difference between the mean test score of Group I, Experimental, before administration of the experimental program, and the mean test score of Group II,
Control, as determined by The Bradley Thought Skill Test, Form I.

8. There will be no significant difference between the mean test score of Group I, Experimental, after administration of the experimental program, and the mean test score of Group II, Control, as determined by The Bradley Thought Skill Test, Form II.

9. There will be no significant difference between the mean test score in curiosity of Group I, Experimental, before administration of the experimental program, and the mean test score of Group II, Control, as determined by the Curiosity Motivation Test, Form I.

10. There will be no significant difference between the mean test score in curiosity of Group I, Experimental, after administration of the experimental program, and the mean test score of Group II, Control, as determined by the Curiosity Motivation Test, Form II.

Definition of Terms

For the purpose of this investigation the following definitions have been formulated:

Curiosity. -- An intrinsic motivation which results from strong needs and goals, a deep desire to find something out.

Thinking. -- Conceived as a process associated with inquiry and decision making (26).
Question.--Any intellectual exercise calling for a response; this would include both problems and projects (27, p. 2).

Thinking Operations.--A complex coordination and integration of skills used in a continuous process through development stages associated with inquiry and decision making (2, p. 9). Also refers to thought processes, as advocated by Raths (26, pp. 5-23) and Bradley and Earp (7, pp. 69-72), and defined as follows:

Applying Facts and Principles in New Situations.--Using what has been learned in one situation in an entirely new situation, discriminating that which is relevant from that which is irrelevant.

Assuming.--Taking for granted that which may be true or false.

Classifying.--Involves analysis and synthesis and is sorting things into groups according to set principles.

Collecting and Organizing Data.--Examining and defining the findings, then placing them in a prescribed order (1st, 2nd, 3rd, etc.).

Comparing.--Observing differences and similarities with the specific purpose of ascertaining what relationship one has with the other.

Criticizing.--Not finding fault or censoring, but making appraisals on the basis of standards set by previous experiences or by alternative standards set by others.
Hypothesizing.--Proposing a possible solution to a certain problem.

Imagining.--Forming some kind of idea about that which is not formally present and/or not fully experienced.

Interpreting.--Explaining the meaning of experiences by the process of understanding what has been put into and extracted from these experiences.

Observing.--Watching, noting, perceiving details, procedures, or substance.

Recalling.--Listing, naming, or bringing forth from memory.

Summarizing.--Briefly stating what has been presented; restating of the big idea in much shorter form.

Discussion of Terms Used in the Study

Curiosity

Frequently, in the classroom the teacher may use the words attention, discovery, interest, creativity, motivation, and problem-solving in close relation to curiosity or give these terms synonymous treatment with curiosity. Since there appears to be more variation in meanings ascribed to the term curiosity, it is necessary to define it more precisely.

According to Adkisson, "Curiosity is an intrinsic energy initiated by environmental stimuli which moves by the means of inquiry into the unknown, bringing forth behavioral investigative acts of manipulation, observation, comparison, and exploration, which through cognitive conflict results in
creative production confirmation, interpretation, and
solution" (2, p. 8).

Maw and Maw state that:

Curiosity may be thought of as the growing age of interest. In the first encounter with a particular object or area of knowledge, the person is aroused to curiosity by the novelty of it. Interests may develop as the person satisfies his curiosity, but curiosity is again aroused as new aspects of the subject are perceived. Either curiosity or interest may exist without the other. Whenever the person chooses to see anything new about the subject of his interest or whenever he lacks the desire to know more about it, he may have an interest without curiosity. Certainly before his early scanning behavior has become particularized he has curiosity but lacks interest in specific things or areas (22, p. 30).

Steing defines curiosity as "...the desire to learn or know anything; inquisitiveness" (30, p. 232). Another similar definition for curiosity is "...a desire to learn or to know" (13, p. 361). A more succinct definition is given as, "...Disposition to inquire into anything...Interest in experiences, collection, or special inquiry..." (25, p. 647).

As defined in the Dictionary of Education curiosity is a:

...tendency to wonder, to inquire, or to investigate, frequently expressed in exploratory or manipulative activities; believed by some to be in part congenial (15, p. 149).

English and English have defined curiosity as "...the tendency to investigate, to seek, to observe the novel, to obtain information" (10, p. 134).

Curiosity is an intrinsic motive which results from an individual's concern for learning more and more (6, p. 248). It is a motive which directs, channels, and sustains purposive,
problem-solving behavior so that persistence in inquiry increases the likelihood that divergent thinking will lead to discovery (26, p. 8).

Maw and Maw have more specifically defined curiosity for their studies by concluding that a child is curious to the degree that he

1. reacts positively to new, incongruous or mysterious elements in the environment by moving toward them or by manipulating them.

2. exhibits a need or a desire to know more about himself and/or his environment.

3. scans his surroundings seeking new experiences, and

4. persists in examining and exploring stimuli to know more about them (21, p. 236).

For the purpose of this study a child within a classroom setting will be considered as curiously aroused when his attention becomes involved in activity which interests him and he expresses an intrinsically motivated desire to know more about the novelty or stimuli through persistent questioning, observation, listening, or reading, in order to satisfy his desire.

Thinking

The abilities to continue the state of doubt and to carry on systematic and protracted inquiry are the two essentials of thinking (11, p. 13). According to Bradley and Earp, thinking may be regarded as a disposition—a complex coordination and integration of specific activities (7, p. 14).
Berlyne distinguishes between curious thinking and creative thinking. He states that curious thinking puts the individual in permanent possession of new knowledge, and that creative or productive thinking calls up remembered knowledge to guide the handling of new or current problems (5, p. 265).

Getzels has identified two processes of thinking as "convergent thinking" and "divergent thinking." Where the mode is toward retaining the known, learning the predetermined, and conserving, convergent thinking is at work. When the process is toward revision, the known, exploring the unknown, and developing what might be, divergent thinking is in progress (14, p. 14).

For the purpose of this study, a child will be considered as using the thought skills when he inquires for facts to some purpose or displays an understanding or comprehension or had an apprehension of general relation to particulars in high-order events, and converts the experience into intelligent functional setting (8).

**Questioning**

Questioning, as it is used in this study, refers to more than posing interrogatives; consequently, Sander's definition of questioning was employed "...a question is any intellectual exercise calling for a response..." (27, p. 2).
Summary

In this chapter the background, significance, general statement of the problem including the purpose, statement of the hypotheses, and the definition of terms used were presented. The following brief preview of chapter organization is presented as an aid to the reader who may wish to refer to a particular section of this study for specific information.

Preview of the Organization of the Study

Chapter II reviews the research in curiosity, questioning and thinking which is pertinent to this study. Included in Chapter III are limitations, basic assumptions, description of the sample, description of the measures employed, research design, procedures for collection of data, and the procedures for analysis of data. The findings of this study relevant to each hypothesis are found in Chapter IV. A review and summary of the findings are found in Chapter V, with resultant conclusion, implications, and recommendations for further study.
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CHAPTER II

REVIEW OF RELATED MATERIAL

The literature pertaining to curiosity, questioning, and thinking operations is vast in amount and is both theoretical and empirical in nature. In discussing the background and significance of the study, a few studies and selections pertaining to the areas of curiosity, questioning, and thinking were reviewed. This chapter will be devoted to elaborating on studies previously mentioned in Chapter I and will present other literature pertinently related to this study.

Literature Pertaining to Curiosity

Maw and Maw have done much pioneering research in the study of the curiosity of children. They have developed, validated, and refined paper and pencil tests for measuring curiosity of the elementary school child through the course of several studies (20, 21, 22, 23, 24). The instruments devised by the Maws measure curiosity in school children with a "reasonable degree of accuracy curiosity in any given child" (21).

In an earlier study by the Maws (20) they hypothesized that if curiosity were to be maintained and developed, adequate measures must be devised. It was their purpose to explore the possibilities of developing paper and pencil tests
to measure curiosity in elementary school children. The investigation was conducted in thirty-eight fifth grade classrooms in New Castle County, Delaware. In designing the measuring instruments, characteristics of high-and low-curiosity children had to be considered. On the basis of the three studies composing the investigation, high-curiosity children as compared to low-curiosity children are those who

1. ask more and better questions,
2. select more outgoing, adventurous activities,
3. have more general information about the world in which they live,
4. can recall more specific facts,
5. relate more frequently to the unbalanced and unfamiliar,
6. persist longer at problem solving, and
7. are more alert to verbal absurdities (20, p. 119).

As a result of paper and pencil tests the Maws found that

1. Paper and pencil tests can be used to measure curiosity in groups of children with a measurable degree of accuracy, but cannot identify curiosity with a high degree of accuracy in any given child.
2. Curiosity can be measured by using test items similar to those used for measuring breadth of knowledge.
3. High curiosity children are more persistent than low curiosity children.
4. Curiosity may be a unique factor and, therefore, is multi-dimensional (20, p. 117-119).
**Epistemic Curiosity**

Berlyne, in developing a theory of human curiosity, differentiated between epistemic and perceptual curiosity. Epistemic curiosity was described as having knowledge as its main fruits and as being a drive which is reducible by knowledge rehearsal. He described perceptual curiosity as a condition found in lower animals as well as in human beings (4, p. 180). A further definition by Berlyne identifies conceptual conflicts as the principal factor producing epistemic curiosity (4, p. 255).

In an experimental study of epistemic curiosity and conceptual conflict, Berlyne employed pre-questioning to determine the influence of curiosity and conceptual conflict upon responses to a subsequent post-questionnaire. He found that

1. Questions heighten epistemic curiosity; facilitating retention of facts that answers when they are subsequently encountered.

2. Questions intensify, not only specific curiosity directed at their answers, but more general curiosity about their topic.

3. Questions about more familiar topics aroused significantly more curiosity.

4. Subjects were desirous of knowing the answer to questions which surprised them (4, pp. 296-99).

Mittman and Terrell (26) designed a study to test Berlyne's theory of epistemic curiosity formulation in children. They sampled first and second grade children in their study who were differentiated with respect to level of epistemic curiosity and required to learn size and form tasks...
concurrently. The children of the high-curiosity group performed in a manner superior to those of the moderate-or-low-curiosity groups. The results were interpreted by the investigators in terms of Berlyne's formulation of conflict arousal as playing a central role in determining the strength of curiosity. Increased conflict and consequent increase in curiosity presumably developed in the moderate-and high-curiosity groups because of their experimental treatment. Mittman and Terrell concluded that if one assumes that "the greater the curiosity the more efficient the learning, the rank order of effectiveness of the three curiosity groups is predictable" (26, pp. 851-855). Tuttle (35) claims curiosity is at the basis of all systematic study and feels it can be accounted for on the basis of some "innate capacity for emotional satisfaction in intellectual grouping."

Children between the ages of four and ten appear to be searching for the truth. Hasbrouch (12) considers this to be the period when children are most curious. Morse and Wingo (27) emphasize the value of coupling training to native curiosity. They state that teaching is blending the child's native curiosity and the school program to the fullest extent of the child's individual capacity. Bruner recognizes curiosity as an important aspect of cognitive growth.

The early helplessness of man, for example, seems to be accompanied by a propelling curiosity about the environment and by much self-reinforcing activity seemingly designed to achieve competence in that environment (8, p. 4).
Maslow maintained that cognitive needs are strong in infancy and early childhood. He noted that the need to know and to understand "...seems to be a spontaneous product of maturation rather than of learning, however defined. Children do not have to be taught to be curious. But they may be taught not to be curious..." (19, p. 96).

Holt, in his provocative book entitled How Children Learn, maintained that grown-ups should allow children to investigate the world around them, for this is their way of making some sense out of it. When adults thwart this impulse too often they can destroy a child's curiosity and make him feel that the world, instead of being full of interesting things to explore and think about, is full of hidden dangers and ways of getting into trouble (13, p. 8).

According to Holt, the school must be a place where children can grow in curiosity. It must be a place which understands the "ways, conditions, and spirit in which children do their best learning." If this need is realized, he sees the school as a place in which all children grow, not just in size but in curiosity, knowledge, courage, confidence, independence, resourcefulness, resilience, patience, competence, and understanding (13, p. 8).
Curiosity and Learning

Bradley contended that no special consideration was being given in schools to providing a reading program that perpetuates the power of the child's curious mind. He described the child for the first few years as "mentally alert, interested, curious, and striving to learn." This "spirit for being curious" is gradually lessened as he progresses through the secondary years (6, p. 448). He recommended that teachers must have a knowledge of each "individual's depth of curiosity" so that they may foster communication of large ideas, arouse new interests, and transform acquired knowledge through the reading act.

Priorities should be established regarding the use of a child's powers of curiosity, and classroom teachers should become aware of each student's "depth of curiosity." Such knowledge about individual students would increase the effectiveness of the teaching role in fostering the students in the construction of large ideas and communicating them, building new interests, and becoming more resourceful and competent in the reading act. Bradley challenges the classroom teacher when he states:

The priority in education today is to catch more children when they exhibit the desire to read and learn and show themselves to be curious...children can become more imaginative, creative, and curious about thinking, the teacher's role must be one of inventor, provider, and improviser (6, pp. 541-542).
Literature Pertaining to Questioning

Questions used by teachers in their discourse and those incorporated in instructional materials probably are significant in guiding the development of pupils' levels of knowledge and achievement. Questions reveal the operational objectives which stress the increase of pupils' skills at interpreting information and ideas (14).

Teachers stress thinking, yet their classroom questions contradict their claims. Over the years, their questions have been primarily concerned with the same thing--memory of facts--specific facts (14). More than fifty years ago Stevens (33) noted a dominant emphasis on memory questions in both English and social studies classes, with social studies calling for this type of question more. Consequently, Stevens called for intelligent use of questions as instructional devices and stated that questions should stimulate reflective thought in addition to mere memorization of facts. Stevens' plea has been greatly ignored.

More recently Adams (1) developed a system of categories by which he classified the questions of teachers and discovered a similar dominating emphasis on memory questions, although the overall proportion, when compared with Stevens' study, was somewhat less. Even so, the overall emphasis on memory question proved memory to be still the cognitive objective receiving the most emphasis in the teaching situation. Davis and Hunkins (10) support this observation in a report on
the nature of textbook questions. They discovered that questions in fifth grade Social Studies textbooks reflected an emphasis on memory. A similar factual emphasis upon memory was found by Pfeiffer and Davis (28) in analyzing teacher-made examinations. In relation to the teacher's use of questions in the classroom setting, Hunkins (14) concluded that

If questions at higher cognitive levels are capable of stimulating achievement, then teachers should be using these questions in much greater numbers than they concurrently do. Teachers by improving their level of questioning, could very well make information more meaningful for their pupils...Higher level questions not only should stimulate higher levels of achievements, but also should make pupils better inquirers into the realm of knowledge (14, p. 332).

The classroom teacher is a motivator and should raise questions that stimulate inquiry or creativity. Berlyne noted that a pattern including both cue stimuli and motivational or drive-inducing stimuli is required both to propel a quest for knowledge and to control its course. The clearest example of such a pattern, he contended, is a question. All specific epistemic behavior must be launched by the equivalent of a question (4, p. 289). Curiosity is aroused in a subject by strange, surprising, or puzzling questions put to him whether by himself or by an external source (3, p. 184). In 1971, Mays (25) conducted an experimental study with fifth graders as the subjects, which reflected Berlyne's thinking about curiosity and questioning. She concluded that the use of selected
questioning procedures increased the curiosity levels of the fifth-graders studied and facilitated growth in reading comprehension among the subjects who participated in the study.

Shelton (32) described a simple process of asking questions and then seeking answers to them as having value in the total learning process. A spiral arrangement was set up with questions requiring curiosity, and thinking as one part of the spiral process. The other half of the spiral process included questions based upon knowledge and were concerned with answer seeking. Shelton summarized that the answer-seeking half of the spiral tends to get most of the attention in too many classrooms, possibly because this half is easier "to teach." It is a challenge to teach thinking, and curiosity is more easily recognized than stimulated (32, pp. 73-76).

Classifying Questions

Loughlin (16) stated that effective questioning is effective teaching. Klebaner (15) adds agreement to Loughlin's claim by stating that the carefully thought out question, used effectively, is vital to achieving the purposes of education.

In his article entitled "Levels of Questioning," Carner stated that teachers must be cognizant of the types of thinking required before they can frame effective questions to assist students in such cognitive development. Teachers need to be aware of the level, concrete or abstract, of questions
which are most suited to a particular learning situation. He stated further that present teacher emphasis is on questions which are answerable by facts.

Wellington and Wellington (36) state that questions to be asked in the classroom should be designed to create anxiety for learning and to put in motion the process of critical thinking. They would develop first the individual's ability to defend his own question, and then his ability to discover answers which he can use to make his own conclusions and judgments in the light of known facts and research.

Bloom et al developed a taxonomy of behaviors in the cognitive domain, arranged from the simple to the complex. The mental processes in the cognitive hierarchy are knowledge (memory), translation, interpretation, application, analysis, synthesis, and evaluation (5). Sanders (30) used the categories of thinking as expressed in the handbook edited by Benjamin S. Bloom, Taxonomy of Educational Objectives, and contended that students can be led to think in each category through the use of taxonomy of questions which he presented in his book, Classroom Questions...What Kinds? Sanders contends teachers should use questions to elicit high-level cognitive reactions from youngsters, rather than to use them strictly for obtaining factual information as seems to be the current practice. He recommends a systematic approach to "question making" in order that the questions prepared for instructional purposes are of the highest quality (30, pp. 1-2).
Floyd's findings (11) are similar in nature to Sander's contentions. He found from a random sampling of forty primary grade teachers that, on the average, for every question asked by a pupil, a teacher asked twenty-seven questions. Only rarely did he find teachers raising questions to stimulate inquiry or creativity. Floyd concluded that the teachers dominated the oral activities, that their methods of asking questions encouraged guessing and slovenly habits of thought, and that they chiefly employed memory questions. He concluded that there existed a poor balance of question types, with memory questions dominating the class activity (11, pp. 53-55). In a recent article Schoeller gives support to Floyd's findings when he states that "too many teachers consistently ask few questions which require thinking, moreover, pupils must be helped to formulate good questions of their own in order to supply motivation and give purpose to reading and learning" (31, p. 55).

Bradley and Earp recognized questioning as the teacher's major teaching tool. They recommended the use of four categories of questions which develop the child's cognitive powers: developing memory skills, developing composite skills, interpretation and inference-making skills, and predicting consequences (7, pp. 69-71).
Literature Pertaining to Thinking

According to Raths (29), there is widespread verbal recognition of the importance of thinking and a strong desire for children to be able to think for themselves, to be self-considerate and thoughtful. In situations that are new, the author stressed that the children will not be rash or hasty in their judgments, and that they will be able to apply knowledge gained from the past; they will be thoughtful.

Thinking is a way of learning. Thinking is one way of inquiring for facts, and if the thinking is to some purpose, the facts so found will be relevant to that same purpose (29, p. 3). However, "in my classrooms, the variety of thinking tasks required of students is limited and may often be restricted to nothing more than recalling memorized information" (17, p. 302). Taba states that "the development of thinking is an objective to which we pay lip service, but which we do not practice" (34, p. 215).

According to Raths, certain behaviors of children change after introduction of a program which has been structured to emphasize thinking (29, p. 23). Berlyne in his discussion of curiosity includes thinking as sequences of symbolic responses through which knowledge exerts its influence over overt behavior. The intervention of symbolic processes between external stimuli and overt responses and the interaction between external stimuli and symbolic processes are what give behavior guided by knowledge its special characteristics: its rationality, its flexibility, its stamp of voluntary and conscious control (4, p. 264).
Raths, after identifying fifteen ways of emphasizing thinking in the classroom, suggested that emphasis upon thinking operations in the early years of education would develop students who would employ more caution in making judgments and drawing conclusions. He avers:

We shall have students who see more than one course of action. We shall have students who are looking for alternatives and delving for assumptions. We shall have students who prize doubt...they will be open minded...ready for change...maintain an experimental outlook on life and be less resistant to problems. To put an emphasis upon thinking is the first long step toward an improvement of the human situation (29, p. 30).

Summary

This chapter was devoted to a review of the literature which pertained to curiosity, questioning, and thinking operations. A discussion was given showing their application to the research conducted.

A theory concerning human curiosity, designed by Berlyne, was reviewed. His work offered a distinction between perceptual and epistemic curiosity. The latter term was used to refer to responses through which knowledge may be acquired. The Maws tested this theory with instruments devised by them which measured curiosity within selected groups as being high or low.

In a study by Mays, the Maw and Maw tests were used, as were the questioning procedures advocated by Bradley and Earp. Mays found that reading comprehension and curiosity could be increased. Davis and Hunkins and several other
writers (6, 9, 11, 14, 32, 34) concluded that there exists a need in the elementary schools for questioning that requires a higher thinking process while primarily emphasizing acquisition of specific factual knowledge.

Questioning arouses curiosity. Teachers can lead students into all levels of thinking through careful use of questions. Questions of the right types can be used to elicit ideas from students, rather than traditional types, which were asked to seek only memorized information. Taba (34) found, when teachers became involved in such a program of stimulated questioning, that advancement was made toward higher levels of thinking.

Thinking is a form of "epistemic" behavior and should be motivated by conflicts in ideas, attitudes, or beliefs. Teachers must acknowledge that a prime reason for which youth ask questions is to increase their information, this in turn will guide their responses in the future.

Mays' (25) investigation indicated that curiosity scores could be increased, and Adkisson's (2) study indicated that students in the first and second grade do improve in academic achievement when exposed to a program which stimulates them to think, but no studies have been made in the area of the effect curiosity constructs and thought skills have upon the responses of black sixth grade pupils. It is with this major tenet that this investigation purports to deal.


24. , "Personal and Social Variables Differentiating Children with High and Low Curiosity," Washington, D. C.


33. Stevens, Romiett, The Questions as a Measure of Efficiency in Instruction, Teachers College Contribution to Education, No. 48, New York, Teachers College, Columbia University, 1912.


CHAPTER III

PROCEDURES FOR COLLECTION AND TREATMENT OF DATA

In Chapter I the background, significance, and general statement of the problem were given. Chapter II was devoted to a review of the literature specifically related to this study. This chapter contains a description of the procedures used, the instruments, the method of collection of data, orientation procedures, experimental treatment of data, and limitations. A purpose of the study was to search for the effect of certain curiosity constructs and thought processes upon the response of black sixth grade pupils.

Description of the Sample

The school district in which this study was conducted serves a population of 22,937. The black population totals 8,072. The schools selected are located on the west and on the south sides of town. The students comprising Group I, Experimental, come from project areas and from neighborhoods of older frame and brick veneer homes. The project areas are new and well kept. One is within a few blocks of the school. The second is located about a mile and a half away. Most homes range from modest frame structures to brick veneer. The elementary school serving this attendance area is about twenty-five years old and contains grades four through six.
The attendance area from which Group II, Control, was selected is one of diversity. The school contains grades one through six. It is located in a neighborhood of new housing developments and is fourteen years old. Most of the black students are bussed in from several areas of the town and live in homes more typical of those in Group I.

Students in Group I are fairly stable in length of attendance in their school. Sixty-five percent of the students have attended their school from grades four to six. Group II students reveal an attendance of seventy-five percent since grade one.

There were 176 black students participating in the study. Of this number eighty-seven were in Group I, Experimental, and eighty-nine were in Group II, Control.

Description of the Community

Housing.--The most salient fact of black housing in the selected community continues to be that of residential segregation. As Faeuher and Faeuher (6) amply document, housing in all U. S. cities with any sizable black population is segregated and differences between cities in degree of segregation are relatively small. Southern cities have the highest indices of residential segregation. The selected community is no exception and is 77.6 segregated.

An analysis of the housing situation reveals that the town has four predominantly black sections. In each of these sections there is an interpenetration of white residences.
Characteristically, blacks and whites live on the same street or have adjacent yards, but facing opposite streets. More recently both races are living in the same urban renewal housing area. In each section the majority of the families have lived in their homes for second and third generations.

Middle class blacks, as defined by Biesanz (3), who live in the town, though economically able, have not actively sought housing in predominantly white sections. Two of the four distinctly black areas, while improving, may be characterized as having homes ranging from inferior to well built. Streets are without curbings and are heavily oiled. Only a few are paved.

Economic factors.--The economic factors related to the selected community are not uncommon to those generally affecting the black population of a small rural town which provides few industrial openings for employment as well as few opportunities for jobs in professional or managerial capacities. The employment status and occupations based on the U. S. 1970 Census report (17) for the community used in this study revealed a total of 3,471 males. Of this number 2,510 were in the labor force; 2,448 were employed and 62 were not employed. The female population was 4,331. Of this number 2,556 were in the labor force; 1,755 were not in the labor force; 2,402 were employed and 154 were not employed. Table I reveals this distribution (17).
<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>3,471</td>
<td>4,331</td>
</tr>
<tr>
<td><strong>Labor Force</strong></td>
<td>2,510</td>
<td>2,556</td>
</tr>
<tr>
<td><strong>Not in Labor Force</strong></td>
<td>961</td>
<td>1,775</td>
</tr>
<tr>
<td><strong>Employed</strong></td>
<td>2,448</td>
<td>2,402</td>
</tr>
<tr>
<td><strong>Unemployed</strong></td>
<td>62</td>
<td>154</td>
</tr>
</tbody>
</table>

The occupational distribution revealed 321 males as professional, technical and kindred workers; 66 as managers and administrators; 33 as sales workers; 130 as clerical, and kindred workers; 100 as craftsmen, foremen and kindred workers; 41 operatives, except transport; 375 as laborers; 50 as farmers; 1,109 as service workers, except private household, and 103 engaged in private work. The occupational distribution for the females revealed 352 as professional, technical and kindred workers; 18 as managers and administrators; 48 as sales workers; 193 clerical and kindred workers; 406 as blue-collar workers; 1,022 as service workers, except private household; and 417 engaged in private household work. Table II reveals this distribution (17).
**TABLE II**

OCCUPATIONAL DISTRIBUTION OF BLACKS IN COMMUNITY USED IN STUDY

<table>
<thead>
<tr>
<th>Occupation</th>
<th>Number of Males</th>
<th>Number of Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional, technical and kindred workers</td>
<td>321</td>
<td>352</td>
</tr>
<tr>
<td>Managers and Administrators</td>
<td>66</td>
<td>18</td>
</tr>
<tr>
<td>Sales workers</td>
<td>33</td>
<td>48</td>
</tr>
<tr>
<td>Clerical and kindred workers</td>
<td>103</td>
<td>193</td>
</tr>
<tr>
<td>Craftsmen, foremen and kindred workers</td>
<td>160</td>
<td>---</td>
</tr>
<tr>
<td>Other blue-collar workers</td>
<td>1,000</td>
<td>506</td>
</tr>
<tr>
<td>Laborers</td>
<td>340</td>
<td>---</td>
</tr>
<tr>
<td>Farm workers</td>
<td>50</td>
<td>---</td>
</tr>
<tr>
<td>Service workers, except private household</td>
<td>109</td>
<td>1,022</td>
</tr>
<tr>
<td>Private household</td>
<td>103</td>
<td>417</td>
</tr>
</tbody>
</table>

The median income for black families is $5,612 (14), which is below other levels in the town as a whole. Most students in the study, however, come from families with a mean income of less than $3,000. These families qualify under any definition of poverty.
Black parents appear to be caught in a treadmill of economic and social deprivation. They continue to be stigmatized as a handicapped minority group because of color, income, occupation, and level of aspiration. The number of upward-mobile blacks is very small for the population of blacks. Few well-trained blacks return to work in the community in this study and without this influx it is likely that discrepancies with the majority will continue in housing, education, occupation and income.

Selected educational characteristics of the families of students in the study were considered to be pertinent. Percentages obtained from the offices of the principals of the schools involved revealed that 2.10 percent of the fathers had graduated from college and 2.13 percent of the mothers had graduated from college, while 25.12 percent of the fathers had graduated from high school, and 37.20 percent of the mothers had completed high school. Parents with less than four years of college revealed a percentage of 23.58. The total percentage of fathers with grammar school education was 43.11 and for mothers with the same amount of education the total was 40.27. The percentage of fathers with less than fourth grade education was 9.17, while mothers revealed a percentage somewhat lower: 7.14.

Table III gives data on selected educational characteristics of parents of students of the study. The information is based upon reports from the office of the principals of the schools involved in the study.
### TABLE III

**SELECTED EDUCATIONAL CHARACTERISTICS OF FAMILIES OF STUDENTS IN STUDY AND OBTAINED PERCENTAGES**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Percentages as obtained from Schools Involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of Fathers who graduated from College</td>
<td>2.10</td>
</tr>
<tr>
<td>Percent of Mothers who graduated from College</td>
<td>2.13</td>
</tr>
<tr>
<td>Percent of Fathers who graduated from High School</td>
<td>25.12</td>
</tr>
<tr>
<td>Percent of Mothers who graduated from High School</td>
<td>37.20</td>
</tr>
<tr>
<td>Percent of Parents with less than 4 years of College</td>
<td>23.58</td>
</tr>
<tr>
<td>Percent of Fathers with grammar school education</td>
<td>43.11</td>
</tr>
<tr>
<td>Percent of Mothers with grammar school education</td>
<td>40.27</td>
</tr>
<tr>
<td>Percent of Fathers with less than 4th grade education</td>
<td>9.17</td>
</tr>
<tr>
<td>Percent of Mothers with less than 4th grade education</td>
<td>7.14</td>
</tr>
</tbody>
</table>

*Chart design based on Faheuher (6)*
Description of Participating Teachers

A total of six teachers were involved in the study. In each group there were two females and one male teacher. In Group I, Experimental, two teachers were black and one white. In Group II, Control, two teachers were white and one black. Group I teachers were younger and had taught fewer years. In Group II the average years of experience was 20. In Group I one teacher was completing the requirements for the Master's degree; one teacher had twenty-one hours completed on the Master's degree; and one was beginning work toward the Master's degree. Two teachers in Group II had completed the Master's degree and had hours beyond the Master's degree level. One teacher was completing the requirements for the Master's degree.

The Experimental Group of teachers were younger than the Control Group of teachers. Ages ranged from twenty-six to thirty for the Experimental Group. The years of experience in the classroom ranged from four years to ten years. One teacher had taught in the fourth, fifth and sixth grades. Two had taught only sixth grade.

The age range for the Control Group of teachers was thirty-seven to forty-seven. The years of experience in the classroom ranged from fifteen years to twenty-five years. Two of the teachers had experience in teaching grades four, five and six. One had taught only sixth grade. Table IV presents this data.
### TABLE IV

A DESCRIPTION OF THE TEACHERS PARTICIPATING IN THE STUDY

<table>
<thead>
<tr>
<th>Teacher Section</th>
<th>Age</th>
<th>Degree</th>
<th>Hours above</th>
<th>Years of Experience</th>
<th>Grade Levels</th>
<th>Race</th>
<th>Sex</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-AE</td>
<td>32</td>
<td>B.S.</td>
<td>21</td>
<td>10</td>
<td>6</td>
<td>Negro</td>
<td>M</td>
</tr>
<tr>
<td>I-BE</td>
<td>26</td>
<td>B.S.</td>
<td>4</td>
<td>4</td>
<td>6</td>
<td>Negro</td>
<td>M</td>
</tr>
<tr>
<td>I-CE</td>
<td>30</td>
<td>B.S.</td>
<td>24</td>
<td>8</td>
<td>4-5-6</td>
<td>White</td>
<td>F</td>
</tr>
<tr>
<td>II-XC</td>
<td>42</td>
<td>M.A.</td>
<td>12</td>
<td>20</td>
<td>4-5-6</td>
<td>White</td>
<td>F</td>
</tr>
<tr>
<td>II-YC</td>
<td>47</td>
<td>M.A.</td>
<td>8</td>
<td>25</td>
<td>4-5-6</td>
<td>White</td>
<td>F</td>
</tr>
<tr>
<td>II-ZC</td>
<td>37</td>
<td>B.S.</td>
<td>24</td>
<td>15</td>
<td>6</td>
<td>Negro</td>
<td>M</td>
</tr>
</tbody>
</table>

**Description of the Instruments Employed**

**Thought Skill Test**

The tests used in this study to measure thinking skills and abilities were produced by the experimenter under the cooperative arrangement of his major professor, and have undergone pilot study work on three separate occasions. It is believed that previous screening and item analysis have yielded some rather refined items for sampling purposes. The items used are obviously limited when compared to "norming procedures" which tend to strengthen the validity and reliability of standardized test construction. The nature of the program
did necessitate the inclusion of several specific tests for
the conduct of this study. No other appropriate intermediate
grade tests of a standardized variety are currently available
for those who wish to measure "thinking skills and abilities."
These thought skill test are entitled The Bradley Thought
Skill Form I and The Bradley Thought Skill Form II. Copies
of Form I and Form II are included in appendices A and B.

The correlation coefficient of the Bradley instrument
with the Maw and Maw instrument was .63 greater than .01
level of confidence. The correlation coefficient of the
Bradley instrument in test and retest with two weeks
interval was .61 greater than .01 level of confidence.

Curiosity Inventory Test

The second test used in this study was a Curiosity
Inventory Test, Forms I and II. They were designed to measure
curiosity levels and were produced by the experimenter under
the cooperative arrangement of his major professor. The
tests are an adaptation of the Frymier Motivational Test
(7, p. 114; 136-139), which was designed to determine how
students think and feel about a number of important topics.
The reliability of the Motivational Test was computed by the
odd-even method. Based on the Kuder-Richardson Reliability
Formula 20, the reliability index is .91. The two forms of
the test employed in this study are included in appendices
C and D.
Achievement Test

The Otis-Lennon Mental Ability Tests, Elementary II Levels, Forms J and K were used and are recommended for grade six. The tests were designed for use with classroom groups and may be easily administered by the classroom teacher. The reliability data for these tests using the Kuder-Richardson reliability coefficient is .95 (9, p. 20).

Teacher Reading Inventory Test

The Inventory of Teacher Knowledge of Reading, which was developed to aid in assessing an individual's understanding of the reading act and the strategies used in reading instruction on the primary-elementary levels, was given to each participating teacher in order to determine her weaknesses and strengths in the instructional setting in reading. Another function of the test was to determine the extent of growth which could take place between the pre- and post-test as a result of conferences and discussions on basic reading methods and an inservice program designed to upgrade their teaching.

Included in the test are 95 multiple-choice items which sample seven areas frequently included as content in basic methods courses. These areas include reading readiness, word perception, comprehension and critical reading, differentiating reading instruction, silent and oral reading, evaluation, diagnosis, and correction, and goals of instruction. The
basic assumption underlying the use of this test is that if each statement were understood by a teacher and properly implemented through instruction, pupil learning would be affected positively.

The test has undergone a number of revisions and has been reviewed by 800 in-service teachers and five reading authorities of national repute. Based on the Kuder-Richardson Reliability Formula 20, the Inventory has a reliability index of .92. Table V presents data concerning the test for participating teachers in the study.

TABLE V

TEST FOR PARTICIPATING TEACHERS IN THE STUDY

<table>
<thead>
<tr>
<th>Test Period</th>
<th>Test</th>
<th>*R.I.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test</td>
<td>Inventory Teacher</td>
<td>.92</td>
</tr>
<tr>
<td>Post-test</td>
<td>Knowledge of Reading</td>
<td>.92</td>
</tr>
</tbody>
</table>

*R.I. = Reliability Index

Detailed information concerning all tests given the students participating in the study is presented in Table VI.
<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
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<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Test</td>
<td>Intermediate II Reading Form W Word Meaning Paragraph Meaning</td>
<td>.90</td>
<td>Form J</td>
<td>.95</td>
<td>Form I</td>
<td>.63</td>
<td>Form I</td>
<td>.91</td>
</tr>
<tr>
<td>Post-Test</td>
<td>Intermediate II Reading Form X Word Meaning Paragraph Meaning</td>
<td>.92</td>
<td>Form K</td>
<td>.95</td>
<td>Form II</td>
<td>.63</td>
<td>Form II</td>
<td>.91</td>
</tr>
</tbody>
</table>

*R.I. - Reliability Index
Research Design And Procedures

Research Design

A parallel-group design was used because it seemed to be most appropriate to meet the needs of this study. When this design is used, the researcher seeks the relative effects of two treatments compared on the basis of two or more groups which are equated in all relevant aspects (11, p. 342-343).

In this research achievement, I. Q., curiosity, sex, and chronological age are considered relevant aspects to the problem under investigation. The basic design of the experiment may be presented as follows (11):

<table>
<thead>
<tr>
<th>Experimental</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pre-test</td>
<td>1. Pre-test</td>
</tr>
<tr>
<td>2. Experimental factor</td>
<td>2. Control factor</td>
</tr>
<tr>
<td>3. Final test</td>
<td>3. Final test</td>
</tr>
</tbody>
</table>

The present study is diagramatically presented in Table VII.
## TABLE VII

### DIAGRAM OF RESEARCH DESIGN

<table>
<thead>
<tr>
<th></th>
<th>Group I</th>
<th>Group II</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Teacher Orientation and Pre-inventory Test</td>
<td>Teacher Orientation</td>
</tr>
<tr>
<td>Week 1</td>
<td>Pre-test Students</td>
<td>Pre-test Students</td>
</tr>
<tr>
<td>Week 2</td>
<td>Experimental Factor</td>
<td>Control Factor</td>
</tr>
<tr>
<td>Week 17</td>
<td>Post-test Students</td>
<td>Post-test Students</td>
</tr>
<tr>
<td>Week 18</td>
<td>Teacher Post Inventory Test</td>
<td>Teacher Inventory Test</td>
</tr>
</tbody>
</table>

The pre-test consisted of the **Stanford Achievement Test, Intermediate Form W**; **Otis-Lennon Mental Ability Test, Form J**; **Form I of the Bradley Thought Skill Test**, and **Form I of the Curiosity Motivation Test**. The post-test was composed of the **Stanford Achievement Test-Intermediate Form X**, **Otis-Lennon Mental Ability Test, Form K**, the **Bradley Thought Skill Test, Form II**, and the **Curiosity Motivation Test, Form II**.

Table XCIll summarizes all tests used in the pre-and post-testing periods.
TABLE VIII
TEST FORMS EMPLOYED IN EACH TESTING PERIOD

<table>
<thead>
<tr>
<th>Name of Test</th>
<th>Periods</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-Test</td>
</tr>
<tr>
<td>Stanford Achievement</td>
<td>Form W</td>
</tr>
<tr>
<td>Otis-Lennon Mental Maturity</td>
<td>Form J</td>
</tr>
<tr>
<td>Bradley Thought Skill</td>
<td>Form I</td>
</tr>
<tr>
<td>Curiosity Motivation</td>
<td>Form I</td>
</tr>
</tbody>
</table>

Selections of Subjects and Assignment to Groups

The subjects of the study were drawn from two elementary schools in the same district. The two schools were selected because they have self-contained sixth grade classrooms. This type of administrative organization was selected because it provided teachers who were familiar with each students' accomplishments and his particular difficulties in each subject. Too, this type of organization gave the teachers control over their instructional situations.

The two elementary schools that participated in the study each contained three sections of sixth grade classes. They were not involved in other research projects; therefore, they were free to take part in this study without being over burdened. Each of the three sections at each school
participated intact in the research study.

Subjects were divided into two groups. Each group was composed of three sections of the sixth grade in one school building. The two groups were in different schools. For clarity these groups are referred to as Group I and Group II.

Orientation of Teachers

The teachers of the Experimental and the Control Group were administered the Inventory of Teacher Knowledge of Reading (1). The purpose of the test was to aid in assessing each teacher's understanding of the reading act and the strategies used in their reading instruction. The investigator was aware of the fact that a teacher's knowledge of reading and instructional practices may not be reflected in what is actually done in the classroom. Understanding and practice are two distinct variables; however, effective practice cannot be carried on without an understanding of what it is one is teaching. Before and after the inventory was given, each thought skill was discussed with each teacher. An analysis was made of each item to determine areas where specific instructional help was needed. Findings from this analysis are reported in Chapter IV.

The Control Group of teachers were given Bradley's monograph on thinking entitled "Strategies for Developing an Elementary School Child's Powers" (4). The experimenter discussed the suggestive ideas with each instructor of the
Control Group. Implementation of the suggested thought process was to be the concern of each instructor. The time limit of the project and dates for the pre- and post-test were given. The teachers of the Experimental Group were given the same attention in the discussion period on the monograph. In addition the teachers of the Experimental Group were given a guide entitled "Experimental Thinking Process Guide" (See Appendix E) and were familiarized with the general plans and time schedule for the experimental process. They were each given a Thought Skill Kit which contained 5x7 stimulus cards in twelve categories of thinking operations patterned after the questioning procedures recommended by Bradley and Earp (5, pp. 65-72).

The cards were devised to arouse the questioning attitude within the pupil. They were used daily for five to ten minutes and progressed from questions of simple recall to questions requiring a critical and high level response. Teachers tallied daily the number of cards used from each category, and also they dated and initialed each card used before replacing it in the kit. This helped to keep "fresh" cards available each time. A check was made to see which cards were preferred and how often the teachers cooperated. The investigator made this check each week and was available upon request to the teachers of the Experimental Group every Tuesday and Thursday during the term of the experiment. In addition, the experimental school was visited by the major professor four times during the experiment.
Classroom demonstrations for using the Thought Skills Kit were given for each teacher of the Experimental Group. Help was given in showing how to give pupils time to think and how to get pupils to formulate and discern pertinent questions during the period.

During the first week of the investigation, all students were given the pre-test in each area of concern in the study. The Control Group was left to regular classroom procedures for the period of the investigation.

**Experimental Treatment**

The orientation period for each group of teachers was held during the first week of the experimental study. Each teacher of both the Experimental and Control Groups was administered the Inventory of Teacher Knowledge of Reading (1) in order to determine any weaknesses in the reading instructional methods of the teachers tested. Weaknesses found were discussed with each teacher for the purpose of helping them to understand where areas of improvement might be made. It was pointed out to the teachers in the Experimental Group what could be done for students in the thought skills area using the Thought Skill Kit.

Teachers of the Control Group were asked to follow whatever questioning procedures they had previously used with success in their regular classroom procedures. To reduce the weaknesses noted from the Inventory Test, discussion periods with each participating instructor were held.
periodically during the course of the investigation. Some examples of discussion held were (1) Standardized Reading Test, and (2) Individual Differences. With respect to Standardized Reading Test, all participating instructors were not in agreement as to the purpose of an acceptable standardized test of reading readiness. Their observation was "that it measures factors similar to those measured by an intelligence test." Discussion of the idea brought forth that attention to developing skills prerequisite for the type of initial reading instruction to be used was most important and that an acceptable standard test of reading readiness would be one which assessed these skills.

Second, was the area of Individual Differences. There was disagreement on how to manipulate special-ability students within groups. Most instructors observed that individual differences of various types do exist among a group of readers but should typically become less noticeable as the pupils progress to upper grades or should diminish as the teacher works with the pupils. It was concluded that both of these situations may occur, but more important to the instructional period in reading was to be certain that each pupil was not deterred from going through similar developmental sequences.

The teachers of Group I, Experimental, received complete instructions on how to use the Thought Skill Kit, which was designed after the questioning procedures recommended by Bradley and Earp (5, pp. 65-72). Each Thought Skill Kit
contained 5x7 cards in twelve categories of thinking operations which were designed to arouse the questioning attitude within the student. A manual of directions was given to each teacher of the Experimental Group. Classroom demonstrations using the Thought Skills Kit were given to each teacher of the Experimental Group.

A tally sheet was provided each instructor to record the number of cards used during each week of the experiment. The experimenter visited with each participating instructor on Tuesday of each week to determine how often the teachers cooperated and to observe the progress reports and utilization of the Thought Skill Kit. Further, each teacher received additional assistance as needed throughout his participation as a teacher of an experimental class section.

The Experimental Group teachers utilized the cards in the Thought Skill Kit for a five to ten minutes period each day. During this period of time students were given the opportunity to explore topics which aroused their curiosity and also were given an opportunity to share their discoveries. Teachers of the Experimental Group were given help in knowing how to give students time to think and how to get students to formulate as well as recognize pertinent questions during a period of discussion. This procedure was in keeping with the observation made by the Maws, who stated that the discussion was the place to raise questions (11, p. 54).
Treatment of Data

Group I and II were given tests at the beginning and the end of the experimental study as described in the section, Research Design, page 48. Scores from these tests served as data. The test used were The Stanford Achievement, Intermediate II, Reading, Forms W and X; the Otis-Lennon Mental Ability Test, Elementary II Level, Forms J and K; Bradley Thought Skill Test, Forms I and II; Curiosity Inventory Test, Forms I and II.

The null hypotheses tested were that no significant differences existed between the mean test score of Group I, Experimental, and Group II, Control, on the pre-test and post-test administration. The t-test was used to determine whether the means of the two groups differed significantly (15, p. 165). A further statistical treatment was determined through analysis of covariance. This technique permitted adjustments in the dependent variable in order to compensate for any lack of equivalence between the groups in the independent variables (15, p. 254).

Limitations

This investigation was restricted to the sixth grade-level students attending two separate schools in the participating school district. The two schools were within the city limits of the school district. The two schools had three sections each of the sixth grade. These six sections
were involved in the study. The classes were heterogeneous and self-contained, with the exception of special playground and music teachers. In this system special classes were provided for the trainable and educable mentally retarded; hence no children were included in the study who might qualify for such classes.

The pre-test-post-test design tended to minimize the influence of uncontrolled factors; however, the following factors may have influenced the results obtained in the conduct of this investigation:

1. The nature of the population, the teaching staff and the setting may have restricted the interpretation of the population participating in this investigation.

2. The length of the period (14 weeks) in which thinking operations were used. The enthusiasm with which pupils were responding to their work near the end of the term suggested that the longer period might be more effective. Moreover, experimental teachers were becoming adept in the use of these special thought skills near the termination of the project.

3. Drop-outs which may have disturbed the equivalence of the groups and necessitated some readjustment in the equating.

4. The data pertaining to curiosity motivation may have been limited by the reliability and validity of the instruments used.

There have been few studies conducted which deal specifically with the curiosity of children. The general value of curiosity is recognized, but no procedure for helping children develop curiosity have been established (10, p. 42).
The present study was an effort to apply known knowledge about curiosity to the thought response of black sixth grade students.

Chapter III has presented a description of the procedures used in this study for the collection and treatment of data. The findings will be reported in Chapter IV.
BIBLIOGRAPHY


CHAPTER IV

FINDINGS

Chapter I presented a general statement of the problem to be researched. In Chapter II, the literature specifically related to the study was revised. Chapter III was organized to give description of the procedures used in collection and treatment of data. The primary purpose of Chapter IV is to report the findings of the study.

The present study tested the premise that the use of high-level questioning will have an effect upon the curiosity levels and thinking processes of black sixth grade students and produce gains in reading comprehension and improve their responses to selected standardized and experimenter made tests. Ten specific hypotheses were formulated and tested.

The results were analyzed both by sections of the Experimental and Control Groups and for the total Experimental and total Control groups. Fisher's $t$ test was used in the statistical analysis. The .05 level of confidence was set for determining the significance of a hypothesis. Computed $t$'s falling within or beyond this level were rejected. A further statistical analysis of the data was computed using the analysis of covariance. All of the statistics submitted within this chapter were derived from the North Texas Computer
Center, January 28, 1974, and analyzed for accuracy by the programmer on the same date.

Findings Relevant to Hypotheses on Responses on the Stanford Achievement Reading Test

Mean Score of Responses on Pre-test.--The responses to questions on the Stanford Achievement Reading Test, Intermediate Form W, were computed for each section of the Experimental and the Control Groups. Each section of the Experimental Group will be designated as A-E; B-E; C-E throughout the study. The sections of the Control Group will be designated as X-C; Y-C; Z-C throughout further elaboration of the study.

The mean score for Section A-E was 41.76; for Section B-E the mean score was 41.13; and for Section C-E the mean score was 49.10 on Word Meaning. On Paragraph Meaning the mean score for Section A-E was 39.89; for Section B-E the mean score was 33.86; and for Section C-E the mean score was 35.82. Table IX presents this data with the standard deviation for each section.
**TABLE IX**

**MEAN SCORE OF EACH SECTION ON THE PRE-TEST OF THE STANFORD ACHIEVEMENT READING TEST FORM W**

<table>
<thead>
<tr>
<th>Section</th>
<th>No.</th>
<th>Word Meaning</th>
<th>Standard Deviation</th>
<th>Paragraph Meaning</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-E</td>
<td>29</td>
<td>41.76</td>
<td>12.24</td>
<td>39.89</td>
<td>10.98</td>
</tr>
<tr>
<td>B-E</td>
<td>29</td>
<td>41.13</td>
<td>14.16</td>
<td>33.86</td>
<td>10.04</td>
</tr>
<tr>
<td>C-E</td>
<td>29</td>
<td>49.10</td>
<td>11.52</td>
<td>35.82</td>
<td>11.29</td>
</tr>
<tr>
<td>X-C</td>
<td>28</td>
<td>49.85</td>
<td>10.46</td>
<td>37.53</td>
<td>9.59</td>
</tr>
<tr>
<td>Y-C</td>
<td>34</td>
<td>41.79</td>
<td>11.18</td>
<td>43.91</td>
<td>11.27</td>
</tr>
<tr>
<td>Z-C</td>
<td>27</td>
<td>68.70</td>
<td>16.58</td>
<td>48.62</td>
<td>11.79</td>
</tr>
</tbody>
</table>

It is to be noted that Section C-E ranked highest in Word Meaning but lowest in Paragraph Meaning for the Experimental Group. Section A-E ranked highest in Paragraph Meaning and second in Word Meaning.

The mean score for Section X-C was 49.85; for Section Y-C the mean score was 41.79; and for the mean score for Section Z-C it was 68.70 on Word Meaning. On Paragraph Meaning the mean score was 37.53 for Section X-C; for Section Y-C the mean score was 43.91; and the mean score for Section Z-C was 48.62.
It is to be noted that Section Z-C had the highest mean score on Word Meaning and on Paragraph Meaning. Section Y-C ranked second in Paragraph Meaning but lowest in Word Meaning.

The mean score for each section of the Control Group was higher than that of the Experimental Group on Word Meaning. The mean score for Section X-C and Z-C ranked higher than scores made by the Experimental Group on Paragraph Meaning. Section Y-C and Z-C ranked higher than scores made by sections in the Experimental Group; however, Section A-E ranked above Section X-C in Paragraph Meaning.

Mean Score of Responses on Post-test.--The mean score in responses to questions on the Stanford Achievement Reading Test, Intermediate II, Form X was computed for each section of the Experimental and Control groups. The mean score for Section A-E was 51.07; for Section B-E the mean score was 46.96; and for Section C-E the mean score was 56.00 on Word Meaning. On Paragraph Meaning the mean score for Section A-E was 54.28; for Section B-E the mean score was 38.45; and for Section C-E the mean score was 44.72. Table X presents this data with the standard deviation for each section.
### TABLE X

MEAN SCORE OF EACH SECTION ON THE POST-TEST OF THE STANFORD ACHIEVEMENT READING TEST FORM X

<table>
<thead>
<tr>
<th>Section</th>
<th>No.</th>
<th>Word Meaning</th>
<th>Standard Deviation</th>
<th>Paragraph Meaning</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-E</td>
<td>29</td>
<td>51.07</td>
<td>14.11</td>
<td>54.28</td>
<td>15.72</td>
</tr>
<tr>
<td>B-E</td>
<td>29</td>
<td>46.96</td>
<td>15.07</td>
<td>38.45</td>
<td>10.14</td>
</tr>
<tr>
<td>C-E</td>
<td>29</td>
<td>56.00</td>
<td>14.68</td>
<td>44.72</td>
<td>10.95</td>
</tr>
<tr>
<td>X-C</td>
<td>28</td>
<td>49.70</td>
<td>10.34</td>
<td>36.46</td>
<td>9.27</td>
</tr>
<tr>
<td>Y-C</td>
<td>34</td>
<td>42.88</td>
<td>10.98</td>
<td>45.23</td>
<td>11.54</td>
</tr>
<tr>
<td>Z-C</td>
<td>27</td>
<td>69.85</td>
<td>16.16</td>
<td>47.07</td>
<td>11.15</td>
</tr>
</tbody>
</table>

It is to be noted that Section A-E ranked highest in the Experimental Group and Section C-E ranked second. The same ranked positions were held in Paragraph Meaning.

The mean score for Section X-C was 49.70; and for Section Z-C the mean score was 69.85 on Word Meaning. On Paragraph Meaning the mean score was 36.46 for Section X-C; for Section Y-C the mean score was 45.23; and the mean score for Section Z-C was 47.07.

It is to be noted that Section Z-C ranked highest on Word Meaning and Section Y-C ranked second. On Paragraph Meaning Section Z-C ranked highest and Section Y-C ranked second. The lowest mean score of the Experimental Group was
higher than the lowest mean score of the Control Group.

Mean Gain and Mean Loss on Stanford Achievement Reading Test Reflected in Post-Test

Mean Gain and Loss in Word Meaning.--The mean scores of the Experimental Group reflected an increase in Word Meaning on the post-test. Table XI presents data on the mean gain and mean loss for each section taking the pre and post-Stanford Achievement Reading Test Forms W and X. Other data relevant to these tests are presented in Table XLIV, Appendix G.

TABLE XI

MEAN GAIN AND MEAN LOSS ON STANFORD ACHIEVEMENT READING TEST FORMS W AND X WORD MEANING

<table>
<thead>
<tr>
<th>Section</th>
<th>No.</th>
<th>Pre-test</th>
<th>Post-test</th>
<th>Gain</th>
<th>Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-E</td>
<td>29</td>
<td>41.76</td>
<td>51.07</td>
<td>9.31</td>
<td></td>
</tr>
<tr>
<td>B-E</td>
<td>29</td>
<td>41.13</td>
<td>46.86</td>
<td>5.83</td>
<td></td>
</tr>
<tr>
<td>C-E</td>
<td>29</td>
<td>49.10</td>
<td>56.00</td>
<td>6.90</td>
<td></td>
</tr>
<tr>
<td>X-C</td>
<td>28</td>
<td>49.85</td>
<td>49.70</td>
<td></td>
<td>0.15</td>
</tr>
<tr>
<td>Y-C</td>
<td>34</td>
<td>41.79</td>
<td>42.88</td>
<td>1.09</td>
<td></td>
</tr>
<tr>
<td>Z-C</td>
<td>27</td>
<td>68.70</td>
<td>69.85</td>
<td>1.15</td>
<td></td>
</tr>
</tbody>
</table>
It is to be noted that Section A-E made a mean increase in Word Meaning of 9.31. The mean score increase for Section B-E was 5.83, and for Section C-E it was 6.90. The increase in mean scores in Word Meaning appears to give strength to the experimental program as applied to black sixth grade students. The increase shown in Section A-E, which was significant at the .05 level of confidence, may be due to the industrious use of the Thinking Skills Kit.

Increase in Word Meaning.—The gain made by the Experimental Group may indicate that Word Meaning can be increased with questioning procedures of Bradley and Earp (1, pp. 65-72). Regression, though small, in Section X-C and the small increase in Sections Y-C and Z-C may indicate, as Manson contends, that thinking tasks were limited to nothing more than recalling memorized information (4, p. 302). The gain made by each section of the Experimental Group may be attributed to the dynamic approach to developing thought skill processes by the participating instructors of the Experimental Group. The strength of the experimental program as applied to black sixth grade students may be considered by combining the mean gains of each section of the groups. The Experimental Group gained a total raw score of 32.04 points and the Control Group gained a total raw score of 2.39 points.

Mean Gain and Loss in Paragraph Meaning.—The mean scores of the Experimental Group reflect an increase in Paragraph
Meaning. Table XII presents data on the mean gain and mean loss for each section taking the pre and post-Stanford Achievement Reading Test Forms W and X. Other data relevant to these tests are presented in Table XLIV, Appendix G.

<table>
<thead>
<tr>
<th>Section</th>
<th>No.</th>
<th>Pre-test</th>
<th>Post-test</th>
<th>Gain</th>
<th>Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-E</td>
<td>29</td>
<td>39.38</td>
<td>54.28</td>
<td>14.39</td>
<td></td>
</tr>
<tr>
<td>B-E</td>
<td>29</td>
<td>33.86</td>
<td>38.45</td>
<td>4.59</td>
<td></td>
</tr>
<tr>
<td>C-E</td>
<td>29</td>
<td>35.82</td>
<td>44.72</td>
<td>8.90</td>
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<tr>
<td>X-C</td>
<td>28</td>
<td>37.53</td>
<td>36.46</td>
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<td>Y-C</td>
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<td>45.23</td>
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</tr>
<tr>
<td>Z-C</td>
<td>27</td>
<td>48.62</td>
<td>47.07</td>
<td>1.55</td>
<td></td>
</tr>
</tbody>
</table>

It is to be noted that Section A-E made a mean score increase in Paragraph Meaning of 14.39. The mean score increase for Section B-E was 4.59 and for Section C-E it was 6.90. The increase in mean scores in Paragraph Meaning may attest to the strength of the experimental program as applied to black sixth grade students over regular classroom procedures. The increase in mean score of Section A-E which was significant at the .05 level of confidence, may be due to the
industrious and consistent use of materials of the Thought Skills Kit.

**Increase in Paragraph Meaning.**--The gain made in the Experimental Group indicated that Paragraph Meaning can be increased by the use of selected question procedures as recommended by Bradley and Earp (1, pp. 65-72). Regressions made by Section X-C and Z-C may be due to limited opportunities to do no more than recalling factual information, as Manson contends happens too frequently in the classroom (4, p. 302). The gain made by each section of the Experimental Group may mean that the experimental program did bring about a change in the responses on Paragraph Meaning in black sixth grade students during the period of this investigation. The strengths of the experimental program as applied to black sixth grade students may be considered by combining the mean gains of section of the groups, A-E, B-E, C-E with X-C, Y-C, Z-C. The Experimental Group had a mean gain of 27.88 while the Control Group, on the other hand had regressed (-3.94).

**Test of Significance**

Table XIII gives the computed $t$ for each hypothesis related to reading achievement with levels of confidence.

Hypothesis 1 stated that there would be no significant difference between the mean score in Word Meaning on the Stanford Achievement Reading Test, Intermediate II, Form W
of the Experimental Group and the Control Group. This hypothesis was rejected because the computed $t = 3.71$ was significant beyond the .05 level of confidence. The Control Group made a significantly higher mean score on the pre-test of Word Meaning than did the Experimental Group.

**TABLE XIII**

DEGREES OF FREEDOM WITH COMPUTED $t$
FOR EACH HYPOTHESIS PERTAINING TO READING ACHIEVEMENT AND TABLED $t$ AT FOUR LEVELS OF CONFIDENCE

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Degrees of Freedom</th>
<th>Computed $t$</th>
<th>.10</th>
<th>.05</th>
<th>.02</th>
<th>.01</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>175</td>
<td>3.17</td>
<td>1.66</td>
<td>1.98</td>
<td>2.35</td>
<td>2.61</td>
</tr>
<tr>
<td>2</td>
<td>175</td>
<td>0.58</td>
<td>1.66</td>
<td>1.98</td>
<td>2.35</td>
<td>2.61</td>
</tr>
<tr>
<td>3</td>
<td>175</td>
<td>3.98</td>
<td>1.66</td>
<td>1.98</td>
<td>2.35</td>
<td>2.61</td>
</tr>
<tr>
<td>4</td>
<td>175</td>
<td>1.43</td>
<td>1.66</td>
<td>1.98</td>
<td>2.35</td>
<td>2.61</td>
</tr>
</tbody>
</table>

Hypothesis 2 stated that there would be no significant difference between the mean score of the Experimental Group and the Control Group in Word Meaning on the Stanford Achievement Reading Test, Intermediate II, Form W. This hypothesis was not rejected because the computed $t = 0.58$, was outside the .05 level of confidence. The Experimental Group made significantly greater mean gain in reading achievement than did
the Control Group. These findings give credibility to the contention that the use of the Thought Skill Kit effectively enhances responses of black sixth grade students to questions on standardized test.

Hypothesis 3 stated that there would be no significant difference between the mean score of the Experimental Group and the Control Group in Paragraph Meaning on the Stanford Achievement Reading Test, Intermediate II, Form X. This hypothesis was rejected, because the computed $t$, 3.98, was significant beyond the .05 level of confidence. The Control Group made a significantly higher mean score on the pre-test in Paragraph Meaning than did the Experimental Group.

Hypothesis 4 stated that there would be no significant difference between the mean score of the Experimental Group and the Control Group in Paragraph Meaning on the Stanford Achievement Reading Test, Intermediate II, Form X. This hypothesis was not rejected, because the computed $t$, 1.43, was not significant at the .05 level of confidence. The Experimental Group made a significantly greater mean gain in Paragraph Meaning than the Control Group. These findings support Hypothesis 4 and also indicate the consistency with which the experimental treatment effected improvement in the responses of black sixth grade students to questions on standardized test.
Findings Relevant to Hypotheses on Responses on Otis-Lennon Mental Ability Tests Elementary II Level, Forms J and K

The Otis-Lennon Mental Ability Tests, Forms J and K, were given by the investigator in order to maintain uniformity in administration of the instrument. These tests were used in accordance with procedures recommended in the manual.

Two testings of mental ability were completed during the course of the investigation. The tests of mental ability were given prior to beginning the experimental program and again at the conclusion of the experimental program. The following data is a description of the results of these test.

Mean Score of Responses on Pre-test.--The mean score of responses to questions on the Otis-Lennon Mental Ability Test, Elementary II Level, Form J, was computed for each section of the Experimental and Control Groups. The mean score for Section A-E was 80.72; for Section B-E the mean score was 80.79; and for Section C-E the mean score was 85.75. Table XIV presents this data.
### TABLE XIV

**MEAN SCORE AND STANDARD DEVIATION OF EACH SECTION ON THE PRE-TEST OF THE OTIS-LENNON MENTAL ABILITY TEST**

**ELEMENTARY II LEVEL**

**FORM J**

<table>
<thead>
<tr>
<th>Section</th>
<th>No.</th>
<th>Mean Score</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-E</td>
<td>29</td>
<td>80.72</td>
<td>12.76</td>
</tr>
<tr>
<td>B-E</td>
<td>29</td>
<td>80.79</td>
<td>11.02</td>
</tr>
<tr>
<td>C-E</td>
<td>29</td>
<td>85.75</td>
<td>8.50</td>
</tr>
<tr>
<td>X-C</td>
<td>28</td>
<td>83.32</td>
<td>8.42</td>
</tr>
<tr>
<td>Y-C</td>
<td>34</td>
<td>81.91</td>
<td>9.08</td>
</tr>
<tr>
<td>Z-C</td>
<td>27</td>
<td>96.22</td>
<td>10.66</td>
</tr>
</tbody>
</table>

It is to be noted that Section C-E ranked highest in mean score for the Experimental Group. Section A-E ranked lowest in mean score in the Experimental Group.

The mean scores in responses to questions on the Otis-Lennon Mental Ability Test Elementary II Level, Form J, for the Control Group were as follows: For Section X-C the mean score was 83.32; for Section Y-C the mean score was 81.91; and for Section Z-C the mean score was 96.22.
It is to be noted that Section Z-C ranked highest in mean score. Section Y-C ranked lowest in the mean score for the Control Group.

**Mean Score of Responses on Post-test.**--The mean score in responses to question on the Otis-Lennon Mental Ability Test, Form K, was computed for each section of the Experimental and Control Groups. The mean score for Section A-E was 81.51; for Section B-E the mean score was 82.27; and for Section C-E the mean score was 87.82. Table XV presents this data.

**TABLE XV**

<table>
<thead>
<tr>
<th>Section</th>
<th>No.</th>
<th>Mean Score</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-E</td>
<td>29</td>
<td>81.51</td>
<td>13.10</td>
</tr>
<tr>
<td>B-E</td>
<td>29</td>
<td>82.27</td>
<td>11.75</td>
</tr>
<tr>
<td>C-E</td>
<td>29</td>
<td>87.82</td>
<td>8.90</td>
</tr>
<tr>
<td>X-C</td>
<td>28</td>
<td>83.78</td>
<td>8.77</td>
</tr>
<tr>
<td>Y-C</td>
<td>34</td>
<td>82.26</td>
<td>9.13</td>
</tr>
<tr>
<td>Z-C</td>
<td>27</td>
<td>96.59</td>
<td>10.43</td>
</tr>
</tbody>
</table>
It is to be noted that Section C-E ranked highest for the Experimental Group. Section A-E ranked lowest in mean score for the Experimental Group.

The mean scores in responses to questions on the Otis-Lennon Mental Ability Test, Elementary II Level, Form J, were computed for each section of the Control Group. The mean score for Section X-C was 83.78; for Section Y-C the mean score was 82.26; and for Section Z-C the mean score was 96.59.

It is to be noted that Section Z-C ranked highest for the Control Group and Section Y-C ranked lowest. Section X-C remained in the same position as on the pre-test.

Increase in Mental Ability.--Mental ability is relatively constant (6, pp. 36-45) and an increase in the raw scores would not necessarily indicate an increase or a decrease in I. Q., since it is a ratio of the mental age divided by the chronological age multiplied by 100 to remove the decimal point. The changes of an individual's I. Q. seem to relate more to personality factors within the individual than to the composition of test items themselves (3, p. 238). Table XVI presents data concerning mean gain and mean loss for each section of the Experimental and Control Groups. Other data relevant to these tests are presented in Table XLIV, Appendix G.
TABLE XVI

MEAN GAIN ON THE OTIS-LENNON MENTAL ABILITY TEST ELEMENTARY II LEVEL FORMS J AND K

<table>
<thead>
<tr>
<th>Section</th>
<th>No.</th>
<th>Pre-test</th>
<th>Post-test</th>
<th>Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-E</td>
<td>29</td>
<td>80.72</td>
<td>81.51</td>
<td>0.79</td>
</tr>
<tr>
<td>B-E</td>
<td>29</td>
<td>80.79</td>
<td>82.27</td>
<td>1.48</td>
</tr>
<tr>
<td>C-E</td>
<td>29</td>
<td>85.75</td>
<td>87.82</td>
<td>2.07</td>
</tr>
<tr>
<td>X-C</td>
<td>28</td>
<td>83.32</td>
<td>83.78</td>
<td>0.46</td>
</tr>
<tr>
<td>Y-C</td>
<td>34</td>
<td>81.91</td>
<td>82.26</td>
<td>0.35</td>
</tr>
<tr>
<td>Z-C</td>
<td>27</td>
<td>96.22</td>
<td>96.59</td>
<td>0.37</td>
</tr>
</tbody>
</table>

It is to be noted that the greatest increase was made by Section C-E and the lowest increase was made by Section A-E of the Experimental Group. Smaller gains were made by each section of the Control Group. These low mean scores may reflect the existence of an underprivileged condition as well as a lack of meaningful experiences in terms of the middle class culture (5, p. 410). The larger gains made by the Experimental Group may be attributed to group exposure to a period of meaningful thought skill experiences which appear to have enhanced the responses of black sixth grade students to questions on a standardized test.
Test of Significance

The pre-test for the Experimental Group revealed a mean score of 82.42 and for the Control Group a mean score of 86.69. Table XVII presents this data. Significance is reported as being either greater or less than .05 level of confidence.

**TABLE XVII**

<table>
<thead>
<tr>
<th>Group</th>
<th>No.</th>
<th>Mean</th>
<th>S.D.</th>
<th>Computed $t$</th>
<th>Level of Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>87</td>
<td>82.42</td>
<td>11.03</td>
<td>-2.54</td>
<td>.10 1.64 .05 1.96 .01 2.57 .001 3.291</td>
</tr>
<tr>
<td>Control</td>
<td>89</td>
<td>86.89</td>
<td>11.25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis 5 stated that there would be no significant difference between the mean test score of the Experimental Group and the Control Group before administration of the experimental program. The null hypothesis was rejected because the $t$ value was -2.54 and was significant beyond the .05 level of confidence.

The post-test for the Experimental Group revealed a mean score of 82.87 and the mean score for the Control Group was 87.08. Table XVIII presents this data.
Hypothesis 6 stated that there would be no significant difference between the mean score of the Experimental Group after the administration of the experimental program and the mean score of the Control Group on the post-test. The null hypothesis was rejected because the computed $t$ value, $-2.44$, was significant beyond the .05 level of confidence.
Findings Relevant to Hypotheses on Responses on Bradley Thought Skill Tests Forms I and II

Mean Score of Responses on Pre-test.--The mean score on responses to questions on The Bradley Thought Skill Test, Form I, was computed for each section of the Experimental and Control Groups. The mean score for Section A-E was 26.48; for Section B_E was 26.24 and for Section C-E the mean score was 31.46. Table XIX presents this data.

TABLE XIX
MEAN SCORE AND STANDARD DEVIATION OF EACH SECTION ON THE PRE-TEST OF THE BRADLEY THOUGHT SKILL TEST FORM I

<table>
<thead>
<tr>
<th>Section</th>
<th>No.</th>
<th>Mean Score</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-E</td>
<td>29</td>
<td>26.48</td>
<td>5.13</td>
</tr>
<tr>
<td>B-E</td>
<td>29</td>
<td>26.24</td>
<td>9.10</td>
</tr>
<tr>
<td>C-E</td>
<td>29</td>
<td>31.65</td>
<td>8.13</td>
</tr>
<tr>
<td>X-C</td>
<td>28</td>
<td>18.42</td>
<td>4.77</td>
</tr>
<tr>
<td>Y-C</td>
<td>34</td>
<td>20.29</td>
<td>5.98</td>
</tr>
<tr>
<td>Z-C</td>
<td>27</td>
<td>25.22</td>
<td>7.41</td>
</tr>
</tbody>
</table>

It is to be noted that Section C-E ranked highest in mean score. Section B-E ranked lowest in mean score in the Experimental Group.
The mean score of responses to questions on The Bradley Thought Skill Test Form I, for Section X-C of the Control Group was 18.42; for Section Y-C the mean score was 20.29. The mean score for Section Z-C was 25.22.

It is to be noted that Section Z-C ranked highest in mean score. Section X-C ranked lowest in mean score.

Mean Score of Responses on Post-test.—The mean score of responses to question on The Bradley Thought Skill Test, Form II, was computed for each section of the Experimental and Control Groups. The mean score for Section A-E was 33.53; for Section B-E the mean score was 32.86; for Section C-E the mean score was 39.45. Table XX presents this data.
### TABLE XX

MEAN SCORE AND STANDARD DEVIATION OF EACH SECTION ON THE POST-TEST OF THE BRADLEY THOUGHT SKILL TEST FORM II

<table>
<thead>
<tr>
<th>Section</th>
<th>No.</th>
<th>Mean Score</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-E</td>
<td>29</td>
<td>33.52</td>
<td>7.91</td>
</tr>
<tr>
<td>B-E</td>
<td>29</td>
<td>32.86</td>
<td>9.21</td>
</tr>
<tr>
<td>C-E</td>
<td>29</td>
<td>39.44</td>
<td>10.01</td>
</tr>
<tr>
<td>X-C</td>
<td>28</td>
<td>19.32</td>
<td>5.18</td>
</tr>
<tr>
<td>Y-C</td>
<td>34</td>
<td>22.52</td>
<td>6.34</td>
</tr>
<tr>
<td>Z-C</td>
<td>27</td>
<td>23.85</td>
<td>7.32</td>
</tr>
</tbody>
</table>

It is to be noted that Section C-E ranked highest in mean score. Section B-E ranked lowest for the Experimental Group.

The mean score for Section X-C of the Control Group was 19.32; for Section Y-C the mean score was 22.52. The mean score for Section Z-C was 23.85.

Mean Gain and Mean Loss in Thought Skills.--It is to be noted that Section A-E had a mean gain of 7.14; for Section B-E the mean gain was 6.98. Table XXI presents this data. Other data relevant to these test are presented in Table XLIV, Appendix G.
TABLE XXI
MEAN GAIN AND MEAN LOSS ON THE BRADLEY
THOUGHT SKILL TEST FORMS I AND II

<table>
<thead>
<tr>
<th>Section</th>
<th>No.</th>
<th>Pre-test Mean Score</th>
<th>Post-test Mean Score</th>
<th>Gain or Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-E</td>
<td>29</td>
<td>26.48</td>
<td>33.52</td>
<td>7.04</td>
</tr>
<tr>
<td>B-E</td>
<td>29</td>
<td>26.24</td>
<td>32.86</td>
<td>6.62</td>
</tr>
<tr>
<td>C-E</td>
<td>29</td>
<td>31.65</td>
<td>39.44</td>
<td>7.79</td>
</tr>
<tr>
<td>X-C</td>
<td>28</td>
<td>18.42</td>
<td>19.32</td>
<td>.09</td>
</tr>
<tr>
<td>Y-C</td>
<td>34</td>
<td>20.29</td>
<td>22.52</td>
<td>2.23</td>
</tr>
<tr>
<td>Z-C</td>
<td>27</td>
<td>25.22</td>
<td>23.85</td>
<td>-1.37</td>
</tr>
</tbody>
</table>

In the Control Group the mean score regressed -1.37 for Section Z-C. Section Y-C had a mean gain of 2.23. Section X-C gained .09 points.

It appears that the use of selected questioning procedures produced a significant gain in responses to questions on an experimenter-made test for black sixth grade students. These gains add support to the use of the Thought Skill Kit, which seeks to develop critical as well as creative thinking. The planned questioning program of this experimental design appears to be superior to regular classroom procedures, as evidenced by the gains made by the Experimental Group.
The mean gain in thought skills was computed for the combined Experimental Group and for the Combined Control Group. The mean score on the pre-test for the Experimental Group was 28.13; and for the post-test the mean score was 35.28.

The mean gain was 7.15. The mean score on the Pre-test for the Control Group was 21.20 and for the post-test the mean score was 21.92. The mean gain was 0.72. The gain was in favor of the Experimental Group, which adds support to the Thought Skill Process. Table XXII gives this data.

### TABLE XXII

<table>
<thead>
<tr>
<th>Group</th>
<th>No.</th>
<th>Pre-test</th>
<th>Post-test</th>
<th>Mean Gain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>87</td>
<td>28.13</td>
<td>35.28</td>
<td>7.15</td>
</tr>
<tr>
<td>Control</td>
<td>89</td>
<td>21.20</td>
<td>21.92</td>
<td>0.72</td>
</tr>
</tbody>
</table>

The gain made by the Experimental Group attaches weight to the importance of the questioning procedures advocated by Bradley and Earp. The low gain made by the Control Group may indicate, as Bradley (1, p. 449) contended and Holt (4, p. 168) declared, that curiosity can be thwarted. The gain in the Experimental Group indicates that Thought Skills
can be increased with the questioning procedures of Bradley and Earp (2, pp. 65-72). The strength of the Experimental program as applied to black sixth grade children may be considered by noting the increase between the mean score of the Experimental Group and the low increase in the mean score of the Control Group. This also means that in each Section of the Experimental Group there was substantial control of the variables and equal exposure to the experimental program. The teacher's tally sheets used to record the number of Thought Skill Cards used in the questioning procedure confirm this observation. Table XXIII gives the Section and summary of the tally sheets, showing the average number of sessions and the average number of Thought Skill stimulus cards used by each teacher during the process of the investigation.

**TABLE XXIII**

**SUMMARY OF TALLY SHEETS SHOWING AVERAGE NUMBER OF SESSIONS AND AVERAGE NUMBER OF THOUGHT SKILL CARDS USED BY EACH TEACHER DURING THE INVESTIGATION**

<table>
<thead>
<tr>
<th>Section</th>
<th>Average Number of 3-5 Minute Sessions</th>
<th>Average Number of Cards Used by Teacher</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-E</td>
<td>72</td>
<td>4.50</td>
</tr>
<tr>
<td>B-E</td>
<td>48</td>
<td>2.00</td>
</tr>
<tr>
<td>C-E</td>
<td>54</td>
<td>3.50</td>
</tr>
</tbody>
</table>
Test of Significance

Table XXIV gives the computed $t$ for each hypothesis related to Thought Skills. Tabled $t$ at four levels of confidence is also presented.

Hypothesis 7 stated that there would be no significant difference between the mean scores of Group I, Experimental, before administration of the experimental program, and the mean test score of Group II, Control, as determined by The Bradley Thought Skill Test Form I. The hypothesis was rejected because the computed $t$, 6.26, was significant beyond the .05 level of confidence.

<table>
<thead>
<tr>
<th>Group</th>
<th>No.</th>
<th>Mean</th>
<th>S.D.</th>
<th>Computed $t$</th>
<th>Tabled $t$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.10 .05 .57 .29</td>
</tr>
<tr>
<td>Experimental</td>
<td>87</td>
<td>28.13</td>
<td>7.96</td>
<td>6.26</td>
<td>1.64 1.96 2.57 3.29</td>
</tr>
<tr>
<td>Control</td>
<td>89</td>
<td>21.20</td>
<td>6.66</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis 6 stated that there would be no significant difference between the mean score of Group I, Experimental, after administration of the experimental program, and the mean test score of Group II, Control as determined by
The Bradley Thought Skill Test Form II. The Hypothesis was rejected because the computed $t$, 10.91 was significant beyond the .05 level of confidence. Table XXV presents this data.

**TABLE XXV**

MEAN STANDARD DEVIATION COMPUTED $t$ RELATING TO EXPERIMENTAL AND CONTROL GROUP SCORES ON THE BRADLEY THOUGHT SKILL TEST FORM II (N=176)

<table>
<thead>
<tr>
<th>Group</th>
<th>No.</th>
<th>Mean</th>
<th>S.D.</th>
<th>Computed $t$</th>
<th>Tabled $t$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>87</td>
<td>35.27</td>
<td>9.46</td>
<td>10.91</td>
<td>1.64</td>
</tr>
<tr>
<td>Control</td>
<td>89</td>
<td>21.92</td>
<td>6.53</td>
<td></td>
<td>1.96 2.57 3.29</td>
</tr>
</tbody>
</table>

The difference between the increase in thought skills made by the Experimental Group and the Control Group was significant. These findings indicate the consistency with which the experimental treatment effected gains in thought skills for the Experimental Group as opposed to the Control Group, which was not exposed to the experimental questioning process but followed regular classroom procedures. These findings give credibility to the contention that the use of selected questioning procedures effectively enhances the thought processes of black sixth grade students.
Findings Relevant to Hypothesis on Responses Curiosity Inventory Test Forms I and II

It appears that the effectiveness of any method of instruction should be evaluated through a consideration of the personality characteristics of the individual, for the individual's dynamics serve a relevant function during a learning process. This is especially true when assessing the effectiveness of a new experimental study, since the learning situations are limited to factors associated with the learner and the experimental material. There is no human monitor to intervene when a learning problem arises between the student and the text. Solutions to learning problems, whether appropriate or inappropriate, emerge as a consequence of the background and nature of the dynamics of the individual.

The Curiosity Inventory Test (CIT) was designed to serve the specific range of black sixth grade students and was administered to all the students before the experimental program. The administration of the test was conducted by the investigator to insure uniformity and clarity of procedures. Each item contained a question which could be marked on a two-point positive or negative scale.

The CIT was scored by devising a scale of values from 10 to 130 with intervals of twenty points. Each interval ranged from low to high curiosity. The sum of the students positive marks was determined and placed on the scale. This
score was the student's curiosity score. Scores above 70 indicated higher curiosity levels. Scores below 70 indicated low curiosity level.

Although not statistically significant, it was interesting to note the tendency of increase in the post-test means for the Experimental Group. This does not appear to be true for the Control Group. The trend in mean scores indicated that during regular classroom learning sessions high levels of curiosity might have been thwarted, while in the experimental classroom low levels of curiosity might have facilitated learning. Increase in curiosity could be due to the reduced role of the teacher as a threat figure, and the simplification of the material to be learned through small units of information with immediate feedback for accuracy of a response.

Mean Score of Responses on Pre-test.—The mean score of responses to questions on Curiosity Inventory Test was computed for each section of the Experimental and Control Groups. The mean score for Section A-E was 92.55; for Section B-E the mean score was 103.72; and for Section C-E the mean score was 90.13. Table XXVI presents this data.
TABLE XXVI

MEAN SCORE STANDARD DEVIATION OF EACH
SECTION ON THE PRE-TEST OF THE
CURIOsITY INVENTORY TEST
FORM I

<table>
<thead>
<tr>
<th>Section</th>
<th>No.</th>
<th>Mean Score</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-E</td>
<td>29</td>
<td>92.55</td>
<td>21.29</td>
</tr>
<tr>
<td>B-E</td>
<td>29</td>
<td>103.72</td>
<td>20.45</td>
</tr>
<tr>
<td>C-E</td>
<td>29</td>
<td>90.13</td>
<td>14.34</td>
</tr>
<tr>
<td>X-C</td>
<td>28</td>
<td>108.10</td>
<td>21.44</td>
</tr>
<tr>
<td>Y-C</td>
<td>34</td>
<td>110.91</td>
<td>8.60</td>
</tr>
<tr>
<td>Z-C</td>
<td>27</td>
<td>109.96</td>
<td>7.36</td>
</tr>
</tbody>
</table>

It is to be noted that Section B-E ranked highest in mean score. Section C-E ranked lowest in mean score in the Experimental Group.

The mean score for Section X-C was 108.10; for Section Y-C the mean score was 110.91; and for Section Z-C the mean score was 109.96. Section Y-C ranked highest in curiosity and Section X-C ranked lowest in curiosity.

Mean Score of Responses on Post-test.--The mean score of responses to questions on the Curiosity Inventory Test Form II was computed for each section of the Experimental and
Control Groups. The mean score for Section A-E was 98.59; for Section B-E the mean score was 107.69, and for Section C-E the mean score was 93.90. Table XXVII presents this data.

**TABLE XXVII**

<table>
<thead>
<tr>
<th>MEAN SCORE STANDARD DEVIATION OF EACH SECTION ON THE POST-TEST OF THE CURIOSITY INVENTORY TEST FORM II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>A-E</td>
</tr>
<tr>
<td>B-E</td>
</tr>
<tr>
<td>C-E</td>
</tr>
<tr>
<td>X-C</td>
</tr>
<tr>
<td>Y-C</td>
</tr>
<tr>
<td>Z-C</td>
</tr>
</tbody>
</table>

The mean score for the Control Group, Section X-C, was 105.57. The mean score for Section Y-C was 108.35, and for Section Z-C the mean score was 101.40.

**Mean Increase and Decrease on Curiosity Inventory Test.**

It is to be noted that Section A-E had a mean increase in curiosity of 6.04. Section B-E had a mean increase of 3.97 and Section C-E had a mean increase of 3.77. Table XXVIII presents this data. Other data relevant to these tests are presented in Table XLIV, Appendix G.
TABLE XXVIII
MEAN GAIN AND MEAN LOSS ON CURIOUSITY INVENTORY TEST FORMS I AND II

<table>
<thead>
<tr>
<th>Section</th>
<th>No.</th>
<th>Pre-test Mean Score</th>
<th>Post-test Mean Score</th>
<th>Gain</th>
<th>Loss</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-E</td>
<td>29</td>
<td>92.55</td>
<td>98.59</td>
<td>6.04</td>
<td></td>
</tr>
<tr>
<td>B-E</td>
<td>29</td>
<td>103.72</td>
<td>107.69</td>
<td>3.97</td>
<td></td>
</tr>
<tr>
<td>C-E</td>
<td>29</td>
<td>90.13</td>
<td>93.90</td>
<td>3.77</td>
<td></td>
</tr>
<tr>
<td>X-C</td>
<td>28</td>
<td>108.10</td>
<td>105.57</td>
<td>2.53</td>
<td></td>
</tr>
<tr>
<td>Y-C</td>
<td>34</td>
<td>110.91</td>
<td>108.35</td>
<td>2.56</td>
<td></td>
</tr>
<tr>
<td>Z-C</td>
<td>27</td>
<td>109.96</td>
<td>101.40</td>
<td>8.56</td>
<td></td>
</tr>
</tbody>
</table>

The mean score regressed for Section X-C -2.53. For Section Y-C the mean score regressed -2.56 and for Section Z-C the mean score regressed -8.56. This means that each section of the Experimental Group received exposure to the experimental program and increased their curiosity, while the Control Group received exposure to regular classroom procedures and reveals, as Holt (4, p. 168) declared, that curiosity can be thwarted.

The use of selected questioning procedures indicates a significant increase in gains in curiosity. The regression in mean scores for the Control Group may have been due to
failure of teachers to be cognizant of methods for stimulating divergent thinking. Manson has contended that "In many classrooms, the variety of thinking tasks required of students is limited and may be restricted to nothing more than recalling memorized information" (7, p. 302). The thinking child is a curious child. He seeks to know more about himself and his environment, because he is curious. His curiosity fosters his behavior toward inquiry.

Mean Gain and Mean Difference in Curiosity of Combined Sections in Each Group.--The mean gain was computed for each group. The mean gain in curiosity for the Experimental Group was 4.58. The mean difference for the Control Group was 4.37. The mean gain for the Experimental Group indicates increase in curiosity. This increase may be due to participation in the experimental program and involvement in the question-making process in the classroom. The regression made by the Control Group may be attributed to a lack of questioning as a stimulating strategy for developing curiosity in the educational encounter, as Holt dogmatically declares (4, p. 168). Table XXIX presents data on the mean gain and mean difference for the Experimental and Control Groups. The pre-test mean was 100.05. The mean for the Control Group on the pre-test was 107.74, and 105.37 on the post-test.
TABLE XXIX
MEAN GAIN AND MEAN DIFFERENCE FOR EACH GROUP IN CURIOSITY

<table>
<thead>
<tr>
<th>Group</th>
<th>No.</th>
<th>Pre-test Mean</th>
<th>Post-test Mean</th>
<th>Mean Gain</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>87</td>
<td>95.47</td>
<td>100.05</td>
<td>4.58</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>89</td>
<td>107.74</td>
<td>105.37</td>
<td></td>
<td>4.37</td>
</tr>
</tbody>
</table>

Test of Significance

Hypothesis 9 states there would be no significant difference between the mean score in curiosity of the Experimental Group and the Control Group on the pre-test. This hypothesis was rejected because the computed t value of -5.60 indicated that the difference between the means was significant beyond the .05 level of confidence. Table XXX presents this data. The mean for the Experimental Group was 95.47 with a standard deviation of 19.65. The mean for the Control Group was 107.74 with a standard deviation of 13.64. The number of subjects totaled 176.
Hypothesis 10 states there would be no significant difference between the mean score in curiosity of the Experimental Group and the Control Group on the post-test. This hypothesis was rejected because the computed $t$, 2.54 was significant beyond the .05 level of confidence. Table XXXI presents this data. The mean for the Experimental Group was 100.05 with a standard deviation of 20.05. The mean for the Control Group was 105.37 with a standard deviation of 13.31. The number of subjects totaled 176.
TABLE XXXI

MEAN STANDARD DEVIATION COMPUTED t RELATED TO EXPERIMENTAL AND CONTROL GROUPS ON POST-TEST OF CURIOUSITY INVENTORY FORM II (N=176)

<table>
<thead>
<tr>
<th>Group</th>
<th>No.</th>
<th>Mean</th>
<th>S.D.</th>
<th>Computed t</th>
<th>Tabled t</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.10</td>
</tr>
<tr>
<td>Experimental</td>
<td>87</td>
<td>100.05</td>
<td>20.05</td>
<td>2.54</td>
<td>1.64 1.96 2.57 3.29</td>
</tr>
<tr>
<td>Control</td>
<td>89</td>
<td>105.37</td>
<td>13.31</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Further Statistical Analysis

Word Meaning.--An analysis of covariance was computed for the data on responses to questions on Word Meaning on the Stanford Achievement Reading Test Intermediate II Form W and Form X with the pre-test as the covariant. Table XXXII presents this data and Table XXXIII presents a summary of the analysis of covariance with the adjusted means. In Table XXXII the Experimental pre-test for mean for the Experimental Group was 44.000 with a standard deviation of 13.058. The post-test mean was 54.678 and the standard deviation was 15.600. The pre-test mean for the Control Group was 52.494 with a standard deviation of 16.994. The post-test mean was 53.235 with a standard deviation of 16.884.
TABLE XXXII

ANALYSIS OF COVARIANCE-TEST OF WORD MEANING PRE AND POST-TEST RESULTS EXPERIMENTAL AND CONTROL GROUPS

<table>
<thead>
<tr>
<th></th>
<th>Experimental</th>
<th></th>
<th>Control</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-test</td>
<td>Post-test</td>
<td>Pre-test</td>
<td>Post-test</td>
</tr>
<tr>
<td>Mean</td>
<td>44.000</td>
<td>54.678</td>
<td>52.494</td>
<td>53.235</td>
</tr>
</tbody>
</table>

It is to be noted that the pre-test scores were related and that the Experimental Group made a significant gain in the post-test as compared to the gain made by the Control Group. The increase made by the Experimental Group was 10.678 in contrast to the gain of .741 points in the Control Group. Even when the incoming level was controlled by the covariance procedure, the Experimental Group did significantly better, as can be determined from the adjusted means.

The F value, 83.7200, necessitated the rejection of Hypothesis 2 which read that there will be no significant differences between the mean score in Word Meaning of the Experimental Group and the Control Group after administration of the experimental program. The F value was significant beyond the .05 level of confidence. Prior to application of the experimental program the Control Group revealed the larger
The adjusted means shows 58.8638 for the Experimental Group as opposed to 49.1443 for the Control Group indicating a significant gain in favor of the Experimental Group. Table XXXIII presents this data.

### TABLE XXXIII

**SUMMARY ANALYSIS OF COVARIANCE-TEST ON WORD MEANING AND ADJUSTED MEANS**

<table>
<thead>
<tr>
<th>Source</th>
<th>D.F.</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>174</td>
<td>11808.8984</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within</td>
<td>173</td>
<td>7957.8516</td>
<td>45.99991</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difference</td>
<td>1</td>
<td>3851.0469</td>
<td>3851.0469</td>
<td>83.7200</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Adjusted Means:
- Experimental: 58.8638
- Control: 49.1443

**Paragraph Meaning.** An analysis of covariance was computed for the data on responses to questions on Paragraph Meaning on the Stanford Achievement Reading Test Intermediate II, Forms W and X, with the pre-test as the covariant. The mean for the Experimental Group on the pre-test was 36.528 with a standard deviation of 10.955. The mean for the post-test was 45.816 with a standard deviation of 14.061. The pre-test mean for the Control Group was 43.337 with a standard deviation of 11.678. The post-test mean was 43.033 with
a standard deviation of 11.563. Table XXXIV presents this data.

TABLE XXXIV
ANALYSIS OF COVARIANCE-TEST ON PARAGRAPH MEANING PRE AND POST-TEST RESULTS EXPERIMENTAL AND CONTROL GROUPS

<table>
<thead>
<tr>
<th></th>
<th>Experimental Pre-test</th>
<th>Experimental Post-test</th>
<th>Control Pre-test</th>
<th>Control Post-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>36.528</td>
<td>45.816</td>
<td>43.337</td>
<td>43.033</td>
</tr>
</tbody>
</table>

It is to be noted that the pre-test scores were related to the post-test scores, and that the Experimental Group made a significant gain in the post-test as contrasted to the gain made by the Control Group. The increase made by the Experimental Group was 9.288, in contrast to the loss of 0.344 points by the Control Group. When controlled by the covariance procedure, it appears that the Experimental Group did significantly better, as can be determined by the adjusted group means.

The F value 69.5051 indicates that Hypothesis 4, which states there will be no significant difference between the mean score in Paragraph Meaning of the Experimental Group and the Control Group, was untenable. The F value was significant beyond the .05 level of confidence. The adjusted mean, which is 49.0876 for the Experimental Group, indicates
a significant gain. Table XXXV presents this data.

**TABLE XXXV**

**SUMMARY OF ANALYSIS OF COVARIANCE-TEST ON PARAGRAPH MEANING AND ADJUSTED MEANS**

<table>
<thead>
<tr>
<th>Source</th>
<th>S.D.</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>174</td>
<td>12963.8789</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within</td>
<td>173</td>
<td>8613.3203</td>
<td>49.7880</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difference</td>
<td>1</td>
<td>3450.5586</td>
<td>3450.5586</td>
<td>69.5051</td>
<td>.0000</td>
</tr>
</tbody>
</table>

Adjusted Mean:
Experimental  49.0876
Control  39.8357

**Mental Ability.**—An analysis of covariance was computed for the data on responses to questions on the Otis-Lennon Mental Ability Test, with the pre-test as the covariant.

In Table XXXVI the Experimental pre-test mean was 82.4253 with a standard deviation of 11.0356. The post-test mean was 83.8736 with a standard deviation of 11.6060. The Control pre-test mean was 86.6966 with a standard deviation of 11.2527. The post-test mean was 87.0899 with a standard deviation of 11.2844.
TABLE XXXVI
ANALYSIS OF COVARIANCE-TEST ON MENTAL ABILITY
PRE AND POST-TEST RESULTS-EXPERIMENTAL
AND CONTROL GROUPS

<table>
<thead>
<tr>
<th></th>
<th>Experimental</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-test</td>
<td>Post-test</td>
</tr>
<tr>
<td>Mean</td>
<td>82.4253</td>
<td>83.8736</td>
</tr>
<tr>
<td>S.D.</td>
<td>11.0356</td>
<td>11.6060</td>
</tr>
</tbody>
</table>

It is to be noted that the pre-test scores were related to the post-test scores and that the Experimental Group made a significant gain in the post-test as compared to the gain made by the Control Group. The increase made by the Experimental Group was 1.45 in contrast to the gain of 9.39 points in the Control Group. When covariance procedures were applied, it appears that the Experimental Group did significantly better, as can be determined by the adjusted means.

The F value was 13.4078 and was significant beyond the .05 level of confidence. The difference between the adjusted mean of the Experimental Group, which was 86.2586, and the Control Group, which was 84.9539, indicates a gain in favor of the Experimental Group. The Hypothesis 6 was untenable, as revealed by data in Table XXXVII.
TABLE XXXVII
SUMMARY OF ANALYSIS OF COVARIANCE-TEST OF MENTAL ABILITY AND ADJUSTED MEANS

<table>
<thead>
<tr>
<th>Source</th>
<th>S.D.</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>174</td>
<td>719.5977</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within</td>
<td>173</td>
<td>667.8391</td>
<td>3.8603</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difference</td>
<td>1</td>
<td>51.7585</td>
<td>51.7585</td>
<td>13.4078</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Adjusted Means:
Experimental 86.2568
Control 84.9539

Thought Skills.—An analysis of covariance was computed for data on responses to questions on the experimenter-made test of Thought Skills, with the pre-test as the covariant.

In Table XXXVIII the mean on the pre-test for the Experimental Group was 28.1264 with a standard deviation of 7.9662. The post-test mean was 35.2758 with a standard deviation of 9.4644. The mean for the Control Group on the pre-test was 21.2022 with a standard deviation of 6.6626. On the post-test the mean was 21.9213 with a standard deviation of 6.5301.
It is to be noted that the pre-test scores was related to the post-test scores and that the Experimental Group made a significant gain in the post-test as compared to the gain made by the Control Group. The increase made by the Experimental Group was 7.15 in contrast to the gain of 0.72 points in the Control. When covariance procedures were applied, it appears that the Experimental Group did significantly better, as can be determined by the adjusted means.

In Table XXIX the F value was 76.2606 and was significant beyond the .05 level of confidence. The adjusted means for the Experimental Group was 32.2334, and for the Control Group the adjusted means was 24.8954. Hypothesis 8, which stated there would be no significant difference, was untenable, and the gain was in favor of the Experimental Group.
TABLE XXXIX

SUMMARY OF ANALYSIS OF COVARIANCE-TEST ON THOUGHT SKILLS AND ADJUSTED MEANS

<table>
<thead>
<tr>
<th>Source</th>
<th>D.F.</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>174</td>
<td>6319.5508</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within</td>
<td>173</td>
<td>4386.1016</td>
<td>25.3532</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difference</td>
<td>1</td>
<td>1933.4492</td>
<td>1933.4492</td>
<td>76.2606</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Adjusted Means:
Experimental 32.2334
Control 24.8954

Curiosity.—An analysis of covariance was computed for the data on responses to questions on the experimenter-made test of Curiosity with the pre-test as the covariant.

In Table XL the mean for the Experimental Group on the pre-test was 95.4713 with a standard deviation of 19.6534. The post-test mean was 100.057 with a standard deviation of 20.5015. The pre-test mean for the Control Group was 109.6416, with a standard deviation of 13.6488. On the post-test the mean score was 105.3708 with a standard deviation of 13.2107. Table XL presents this data.
TABLE XL

ANALYSIS OF COVARIANCE-TEST OF CURIOSITY
PRE AND POST-TEST RESULTS EXPERIMENTAL
AND CONTROL GROUPS

<table>
<thead>
<tr>
<th></th>
<th>Experimental</th>
<th></th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre-test</td>
<td>Post-test</td>
<td>Pre-test</td>
</tr>
<tr>
<td>Mean</td>
<td>95.4713</td>
<td>100.0575</td>
<td>109.7416</td>
</tr>
</tbody>
</table>

It is to be noted that the pre-test scores were related to the post-test scores and that the Experimental Group made a significant gain in the post-test as compared to the gain made by the Control Group. The increase made by the Experimental Group was 4.58 in contrast to the regression of 4.37 points in the Control Group. When controlled by covariance procedures, it appears that the Experimental Group did significantly better, as determined by the adjusted group means.

Table XLI reveals an F value of 65.2882. The adjusted mean for the Experimental Group is 106.9284. The adjusted mean for the Control Group is 98.6542. The gain was in favor of the Experimental Group. The F value was significant beyond the .05 level of confidence, thus making Hypothesis 10 untenable. Table XLI presents this data.
### TABLE XLI

**SUMMARY OF ANALYSIS OF COVARIANCE-TEST OF CURIOSITY AND ADJUSTED MEANS**

<table>
<thead>
<tr>
<th>Source</th>
<th>D.F</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>174</td>
<td>9311.5703</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within</td>
<td>173</td>
<td>6760.3086</td>
<td>39.0769</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difference</td>
<td>1</td>
<td>2551.2617</td>
<td>2551.2617</td>
<td>65.2882</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Adjusted Means:
- Experimental: 106.9284
- Control: 98.6542

The analysis of covariance, when applied to each hypothesis of no significant difference between the groups, reveals in each instance a significant difference between the two groups. Adjustment of the criterion mean to compensate for the initial differences resulted in slight increases in the Experimental Group and downward adjustments in the Control Groups. Inspection of the adjusted means gives support to the experimental program as applied to black sixth grade students, who performed significantly better in responses to standardized test and experimenter-made test than black sixth grade students who were taught by conventional classroom techniques.
Five additional hypotheses have been formulated which deal specifically with the total mean test scores and are stated fully in Appendix H, page 174. Summarily, each of the five hypotheses states that there will be no significant difference between the mean gains in the total scores of Group I, Experimental, and Group II, Control, on each of the following test: **Stanford Achievement Reading Test, Intermediate II, Forms W and X, Word Meaning; Stanford Achievement Reading Test, Intermediate II, Forms W and X, Paragraph Meaning; Otis-Lennon Mental Ability Test, Forms J and K, The Bradley Thought Skill Test, Forms I and II, and the Curiosity Inventory Test, Forms I and II.**

In each case the hypothesis was rejected, because the analysis of covariance technique, which tested the significance of adjusted mean gains, indicated that the performance of the Experimental Group surpassed that of the Control Group. The increase in favor of the Experimental Group gives support to the use of thought skill procedures as a classroom teaching strategy for improving the responses of black sixth grade students to standardized tests and experimenter-made tests.

This chapter has presented the findings of the investigation. Chapter V will present the summary, conclusions, implications, and recommendations.
BIBLIOGRAPHY


CHAPTER V

SUMMARY, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Summary

Hypotheses

Major Purpose of the Investigation.--The major purpose of this investigation was concerned with the problem of determining the value of certain curiosity constructs and thought skill experiences upon "raw score" responses of black sixth grade students to selected standardized and experimenter-made tests.

More specifically, in seeking a solution to the problem, answers were sought to the following questions:

1. Does the use of selected questioning procedures produce a significant gain in responses to questions on selected standardized test and experimenter-made tests, over the use of regular classroom procedures?

2. Does the use of selected questioning procedures produce a significant gain in reading achievement over the use of regular classroom procedures?

3. Does the use of selected questioning procedures produce a significant increase in curiosity over the use of regular classroom procedures?
4. Is there any significant difference in the responses of the participating teachers on the pre and post-
Inventory of Teacher Knowledge of Reading?

In order to answer these questions the following hypotheses were formulated:

1. There will be no significant difference between the mean score in responses to questions on the pre-test in Word Meaning on the Stanford Achievement Reading Test, Intermediate II, Form W, made by Group I, Experimental, and Group II, Control.

2. There will be no significant difference between the mean score in responses to questions on the post-test in Word Meaning on the Stanford Achievement Reading Test, Intermediate II, Form X, made by Group I, Experimental, and Group II, Control.

3. There will be no significant difference between the mean score in responses to questions on the pre-test in Paragraph Meaning on the Stanford Achievement Reading Test, Intermediate II, Form W, made by Group I, Experimental, and Group II, Control.

4. There will be no significant difference between the mean score in responses to questions on the post-test in Paragraph Meaning on the Stanford Achievement Reading Test, Intermediate II, Form X, made by Group I, Experimental, and Group II, Control.
5. There will be no significant difference between the mean test score of Group I, Experimental, before administration of the experimental program and the mean test score of Group II, Control, as determined from the Otis-Lennon Mental Ability Test, Form J.

6. There will be no significant difference between the mean test score of Group I, Experimental, after administration of the experimental program, and the mean test score of Group II, Control, as determined from the Otis-Lennon Mental Ability Test, Form K.

7. There will be no significant difference between the mean test score of Group I, Experimental, before administration of the experimental program, and the mean test score of Group II, Control, as determined by the Bradley Thought Skill Test, Form I.

8. There will be no significant difference between the mean test score of Group I, Experimental, after administration of the experimental program, and the mean test score of Group II, Control, as determined by The Bradley Thought Skill Test, Form II.

9. There will be no significant difference between the mean test score in curiosity of Group I, Experimental, before administration of the experimental program, and the mean test score of Group II, Control, as determined by the Curiosity Motivation Test, Form I.
10. There will be no significant difference between the mean test score in curiosity of Group I, Experimental, after administration of the experimental program, and the mean test score of Group II, Control, as determined by the Curiosity Motivation Test, Form II.

Subjects for the Investigation.--To test the hypotheses, subjects for the investigation consisted of 176 black sixth grade students attending two separate schools with self-contained classrooms in the area of Harrison County. The subjects comprised the total black population of the sixth grade in the two schools.

Experimental design.--A Parallel-group design was used. The 176 subjects were used intact in each school. Each school contained three sections of sixth grade students. Group I became the Experimental Group and consisted of 88 subjects. Group II became the Control Group and consisted of 89 subjects. The total was 176 subjects for the study. The parallel design used may be seen in Table IV, page 44.

Experimental teachers were furnished with a guide which contained the general plans for the study, information on the use of the stimulus cards in the Thought Skills Kit, and the guidelines for identifying and fostering curious behavior. The guide may be seen in Appendix E. Classroom demonstrations were given for use of the Thought Skill Kit.
Stimulus program.--The stimulus program was patterned after the questioning procedure recommended by Bradley and Earp, and consisted of a Thinking Skills Kit. The kit contained 5x7 cards displaying pictures, statements, and questions designed to arouse the questioning attitude within the child. Table XXIII gives the amount of stimulus exposure each group received.

Instruments.--The instrument employed to measure thinking skills and abilities was The Bradley Thought Skill Test, Forms I and II (See Appendix A and B). The reading achievement of the sixth grade students was tested utilizing the Stanford Achievement Reading Tests, Intermediate II, Forms W and X. To measure the ability the Otis-Lennon Mental Ability Tests, Forms J and K, were used. The two latter tests are commercially printed and sold by Harcourt, Brace, and World. A final test used to measure curiosity levels entitled Curiosity Motivation Test, Forms I and II, was produced by the experimenter under the cooperative arrangement of his major professor (See Appendix C and D).

Statistical treatment.--After collection of the data, the tenability of the hypotheses of the study were tested by the following statistical treatment:

1. The research hypotheses were stated in the null form.
2. Each hypothesis was tested by the utilization of the significance of differences between two means. Fisher's \( t \)
test was used to ascertain the level of confidence which could be placed in the difference between the means.

3. A further statistical treatment was determined through analysis of covariance, for determining the adjusted means.

4. The findings were arbitrarily rejected or retained at the .05 level of significance.

Findings

The findings of this investigation are limited to the two schools in which the data was gathered. It is not intended that the findings be generalized to other situations dissimilar to those described for this experiment.

Reading Achievement.—Hypothesis 1, which stated there would be no significant difference between the mean score of the Experimental Group and Control Group on Word Meaning, in the pre-test, was rejected. Hypothesis 2, which stated there would be no significant difference between the mean score of the Experimental Group and Control Group on Word Meaning in the post-test was not rejected. A mean gain in favor of the Experimental Group, was found. Hypothesis 3, which stated there would be no significant difference between the mean score of the Experimental Group and the Control Group on Paragraph Meaning in the pre-test, was rejected. Hypothesis 4, which stated there would be no significant difference between the mean score of the Experimental Group and the
Control Group on Paragraph Meaning in the post-test, was retained. A mean gain in favor of the Experimental Group was found. Table XLII summarizes this data.

**TABLE XLII**

**SUMMARY OF FINDINGS ON HYPOTHESES RELEVANT TO READING ACHIEVEMENT**

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Group</th>
<th>Level of Confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>E-I and C-II</td>
<td>( &gt; .05 )</td>
</tr>
<tr>
<td>2</td>
<td>E-I and C-II</td>
<td>( &lt; .05 )</td>
</tr>
<tr>
<td>3</td>
<td>E-I and C-II</td>
<td>( &gt; .05 )</td>
</tr>
<tr>
<td>4</td>
<td>E-I and C-II</td>
<td>( &lt; .05 )</td>
</tr>
</tbody>
</table>

**Mental Ability.**--Hypothesis 5, which stated there would be no significant difference between the mean score in mental ability of Group I, Experimental, and Group II, Control, before administration of the experimental program, was rejected. Hypothesis 6, which stated there would be no significant difference between the mean score in mental ability of Group I, Experimental, and Group II, Control, after administration of the experimental, was not rejected.

**Thought Skills.**--Hypothesis 7, which stated there would be no significant difference between the mean test score in thought skill of Group I, Experimental, and Group II, Control, on the pre-test was rejected. Hypothesis 8, which stated there
would be no significant difference between the mean test score in thought skills of Group I, Experimental, and Group II, Control, on the post-test, was rejected. A mean gain in favor of the Experimental Group was found.

**Curiosity.**—Hypothesis 9, which stated there would be no significant difference between the mean score in curiosity of Group I, Experimental, and Group II, Control, on the pre-test was rejected. Hypothesis 10, which stated there would be no significant difference between the mean score in curiosity of Group I, Experimental, and Group II, Control, on the post-test was not rejected. A mean gain in favor of the Experimental Group was found. The Control Group did not make significant gains over the Experimental Group in curiosity. The findings indicated a regression in curiosity motivation.

Table XLIII summarizes the findings for hypotheses seven through ten. The level of confidence for each hypothesis is indicated.
### TABLE XLIII

**SUMMARY OF FINDINGS FOR HYPOTHESES SEVEN THROUGH TEN**

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Group</th>
<th>Level of Confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>E-I and C-II</td>
<td>( &gt; .05 )</td>
</tr>
<tr>
<td>6</td>
<td>E-I and C-II</td>
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<td>8</td>
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<tr>
<td>9</td>
<td>E-I and C-II</td>
<td>( &gt; .05 )</td>
</tr>
<tr>
<td>10</td>
<td>E-I and C-II</td>
<td>( &lt; .05 )</td>
</tr>
</tbody>
</table>

**Summary of Significant Findings**

Findings on the four significant questions which have been considered in the study were restated in the introduction of this chapter and have been selected for summarizing in this section.

**Question One**

Does the use of selected questioning procedures produce a significant gain in responses to questions on selected standardized tests and experimenter-made test, over the use of regular classroom procedures?
1. **Hypothesis 1**: There was a significant difference between the mean score in responses to questions on the pre-test of Word Meaning for Group I, Experimental, and Group II, Control, with the difference being in favor of Group II, Control.

2. **Hypothesis 2**: There was a significant difference between the mean score in responses to questions on the post-test of Word Meaning for Group I, Experimental, and Group II, Control, with the difference being in favor of Group I, Experimental.

3. **Hypothesis 3**: There was a significant difference between the mean score in responses to questions on the pre-test of Paragraph Meaning for Group I, Experimental, and Group II, Control, with the difference being in favor of Group II, Control.

4. **Hypothesis 4**: There was significant difference between the mean score in responses to questions on the post-test on Paragraph Meaning for Group I, Experimental, and Group II, Control, with the difference being in favor of Group I, Experimental.

5. **Hypothesis 5**: There was a significant difference between the mean score in responses to questions on the pre-test of Mental Ability for Group I, Experimental, and Group II, Control, with the difference being in favor of Group II, Control.
6. **Hypothesis 6:** There was a significant difference between the mean score in responses to questions on the post-test of Mental Ability for Group I, Experimental, and Group II, Control, with the differences being in favor of Group II, Control. The Experimental Group did, however, make the larger increase in mean score.

7. **Hypothesis 7:** There was significant difference in the mean score in responses to questions on the pre-test of Thought Skills for Group I, Experimental, and Group II, Control, with the difference being in favor of Group I, Experimental.

8. **Hypothesis 8:** There was a significant difference in the mean score in responses to questions on the post-test of Thought Skills for Group I, Experimental, and Group II, Control, with the difference being in favor of Group I, Experimental.

9. **Hypothesis 9:** There was a significant difference between the mean score in responses to questions on the pre-test in Curiosity for Group I, Experimental, and Group II, Control, with the difference being in favor of Group II, Control.

10. **Hypothesis 10:** There was a significant difference between the mean score in responses to questions on the post-test in Curiosity for Group I, Experimental, and Group II, Control, with the difference being in favor of Group II, Control; however, Group I, Experimental, did make the larger
increase in curiosity.

**Question Two**

Does the use of selected questioning procedures produce a significant gain in reading achievement over the use of regular classroom procedures?

1. **Hypothesis 2**: There was a significant gain in favor of Group I, Experimental, on *Word Meaning*.

2. **Hypothesis 4**: There was a significant gain in favor of Group I, Experimental, on *Paragraph Meaning*.

**Question Three**

Does the selected questioning procedure produce a significant increase in curiosity and thought skills, over the use of regular classroom procedures?

1. **Hypothesis 8**: The gain between the mean scores of Group I, Experimental, and Group II, Control, were significant, the difference being in favor of Group I, Experimental. The significance indicated the strength of the experimental program using selected questioning procedures over regular classroom procedures.

2. **Hypothesis 10**: The gain between the mean score of Group I, Experimental, and Group II, Control, were significant, the difference being in favor of Group I, Experimental. The significance indicates the strength of the experimental program using selected questioning procedures over regular classroom procedures.
Question Four

Is there any significant difference in the responses of the participating teachers on the pre-and post-Reading Inventory Test?

A significant change in mean average of the Experimental Group teachers was noted after discussion sessions with the teachers on weaknesses as observed through their answers given on the test. The mean average was 71.66 for the Experimental Group, and for the Control Group the mean score was 85.00. The post-test revealed a mean score of 89.66 for the Experimental Group of teachers. This was a gain of 18 points. The Control Group of teachers has a post-test mean score of 87.20. This was a gain of 2.20 points.

The findings relevant to the first three questions, as summarized in this chapter, indicate that the use of selected questioning procedures advocated by Bradley and Earp increased the thought skill processes of the black sixth grade students who participated in this study and also facilitated their growth in reading achievement; however, it is to be noted that reading achievement scores are concomitantly increased with curiosity scores.

Findings on question four indicate that teachers, when given an opportunity to discuss, analyze and evaluate their weaknesses and to also share their experiences in reading situations, can improve their responses to questions on a standardized test. Hopefully, classroom competency will also be enhanced.
Conclusions

**Question One**

Does the use of selected questioning procedures produce a significant gain in responses to questions on selected standardized tests and experimenter-made tests over the use of regular classroom procedures?

1. The evidence suggests that a planned program of thought skill questions may have a relatively positive effect upon the responses of black sixth grade students to questions on standardized and experimenter-made tests. It appears that students when left in the normal school situation with no special help do show gains in their responses to questions on standardized tests, but the gains were not as great as those of students exposed to the experimental program. Hypotheses 2, 4, 6, 8, and 10 give support to this conclusion. Therefore, it seems reasonable to conclude that teachers must develop thought skills through specific instructional acts, or children may remain at a very low level of cognitive response throughout their elementary-school, and perhaps secondary-school experience.

**Question Two**

Does the use of selected questioning procedures produce a significant gain in reading achievement over the use of regular classroom procedures?
2. The use of selected thought skills significantly increased the gains in reading achievement made by the subjects of the Experimental Group over the gains made by subjects of the Control Group, where regular classroom procedures were used. Hypotheses 2 and 4 support this conclusion.

**Question Three**

Does the selected questioning procedure produce a significant increase in curiosity and thought skills over the use of regular classroom procedures?

3. The findings of Hypotheses 8 and 10 indicate significant gain made by the Experimental Group on experimenter-made test. The use of selected questioning procedures significantly increased the gain in thought processes and in curiosity made by the Experimental Group over gains made by the Control Group, where regular classroom procedures were followed.

**Question Four**

Is there any significant difference in responses of participating teachers on the pre and post-Reading Inventory Test?

4. Classroom teachers when given the opportunity to analyze, discuss, and evaluate their weaknesses in a reading situation improve in their responses to questions on a standardized test. Further, teachers who were exposed to such inservice experiences did demonstrate more concern about the progress of their students and an awareness that their
repertoire of techniques must include many strategies involving questioning. They also discovered that planned strategies of instruction started with an identification of the kind of thinking behavior desired at a particular time.

As participants in the experimental program, the teachers became aware that in a classroom of black students, there is often too much emphasis placed upon factual and recall questions that require the students to memorize and regurgitate well established information. Such questioning they found did not always successfully stimulate the black student's imagination, his thought process or stimulate and heighten his curiosity level. Questions which sought to develop high critical and creative responses became an essential part of their teaching process. The use of the **Thought Skills Kit** became a dynamic resource for enhancing the questioning process with the purpose in mind of releasing the human potentialities of these black sixth grade students.

The awareness of the participating teachers to the nature of the thought skill procedures significantly increased the gains of the experimental subjects in their responses to test items on the standardized test as well as the experimenter-made test in thought skills and curiosity. This conclusion became evident when the Experimental Group's gains are compared with the gains made by the Control Group, where regular classroom procedures were followed.
Implications

The following implications are inferred from an analysis of the findings and conclusions in this study:

1. The data imply that the major instructional tool of the classroom teacher is his questioning procedure and that the questioning behaviors advocated by Bradley and Earp might well be implemented into the classroom activities of black sixth grade students.

2. Further, the implication is that teachers should be taught how to effectively arouse curiosity from within the student, using external stimuli similar to the stimulus cards used in this study.

3. Thinking operations used as channels of questioning do not need to be specifically taught during the reading encounter in order to increase reading achievement or curiosity level. Teachers usually ask questions for which they know correct answers. The data implies that teachers should ask more questions for which they do not have answers, questions that deal with policy, trends, and issues, contrary-to-fact situations, or seek explanations the teacher does not yet have. Such questions eliminate the pointless game in which the student tries to guess what is in the teacher's mind.

4. During the course of the investigation, it was discovered that several of the thought skill operations used in the skill kit were not employed in the standardized tests.
The implication is that standardized tests as constructed are inadequate for school programs which have a thinking centered curriculum as opposed to a factual centered curriculum.

Recommendations for Further Research

As a result of this present study the following recommendations are made:

1. Better instruments need to be devised, validated, and reliability established through several pilot studies for black sixth grade students.

2. A study should be made of curriculum materials used in the sixth grade to ascertain if they foster an approach to learning involving the questioning procedures advocated by Bradley and Earp.

3. A study should be made using the Thought Skill Kit with black students in lower elementary grades.

4. A study should be made using the Thought Skill Kit with black students who have poor reading habits or exhibit instances of reading retardation due to poor vocabulary and paragraph comprehension.

5. Modification of the study may prove to be productive if the time period could be lengthened and the number of subjects increased.

6. An investigation employing samples different from the one in the investigators' research would provide a broader bases for generalizations.
7. A study should be made which includes training of selected teachers in forming specific types of questions in reading or social studies and then examining the reading or social studies achievement of their students by contrasting the results obtained with achievement of students of teachers who had not received the training. The study may add clarity to the questions: Does better questioning by teachers improve student's achievement and can teachers be instructed in improving questioning strategies?

8. A study should be made of transfer effects of students' thinking and curiosity levels in other curricular areas of the school day beside reading.
BIBLIOGRAPHY


Suzy had a little goat
She hit him with her fist
The reason that she did it
He wouldn't do the twist.

1. This is:
   (a) creative or original thinking
   (b) memorizing
   (c) seeing likeness and differences
   (d) sorting ideas into some order according to some rule

2. What are these?
   1492, 1860, 1845, 1607
   (a) numbers
   (b) unknowns
   (c) facts about our history
   (d) arithmetic problems

A teacher asks her class to prepare an experiment that would help the class decide why one fish in a bowl was much smaller than were the other five fish.

3. What type of thinking is this teacher helping her children learn to use?
   (a) guessing
   (b) remembering
   (c) observing
   (d) summarizing

4. If the teacher asks you to read a long chapter and then write one paragraph about what you read, this is an experience in:

- (a) finding facts
- (b) recalling information
- (c) briefly stating (writing) what has been presented
- (d) listing details

A teacher asked her children to watch exactly what she did. She got up from her chair, walked over to the window and closed it. When asked what she did, one child said, "You got up from your chair, walked over to the window and closed it because you were cold."

5. The child's words show the type of thinking he was doing. What type was it?

- (a) observation
- (b) made on assumption (guessed to be true)
- (c) describing
- (d) noticing and seeing

6. If you were asked to compare two things, what would you be doing as a thinking act?

- (a) looking for likenesses
- (b) looking for differences
- (c) looking for both likenesses and differences
- (d) choosing things that have apparent relationship to one another

7. If your teacher asks you to arrange a variety of items into some category or group - such as if you were listing books under two headings -- BOOKS I LIKED: BOOKS I DO NOT LIKE, what type of thinking activity are you doing?

- (a) seeing relationships
- (b) classifying items
- (c) making arrangements
- (d) setting up of the categories

8. When you are asked to place information in an orderly pattern or arrangement by answering the teacher's questions of "What came first?" or "What happened then?", what thought skill is being used?

- (a) collecting information
- (b) presenting information
- (c) organizing information
- (d) looking for information
9. A person who does critical thinking recognizes that he is making guesses about something so he does not treat his ideas as:

(a) assumptions (guesses)
(b) worthwhile
(c) being true
(d) facts

10. A little boy was playing with matches which he should not do. Later in the day firemen were called to put out a fire in a closet in the little boy's house. A neighbor boy said, "I know who started the fire." Which answer best explains the cause of the fire?

(a) "The little boy playing with matches did it."
(b) "I'll bet the little boy playing with matches did it."
(c) "No one can be sure who started the fire."
(d) "If one plays with matches it is more likely that a fire can be started accidentally."

11. When your teacher asks you to criticize an art picture, a book, a picture, or someone's opinion, what is she really trying to get you to do?

(a) To tell why you don't like it
(b) To tell what you like about it
(c) To help you learn to find a basis (reason for what you are saying
(d) To help the other child to see what's wrong with his work

12. When one makes a decision he uses his own feelings, beliefs, attitudes, or thoughts which he likes. Which statement below best tells that one is using his own judgement to make a decision:

(a) "This is what I stand for."
(b) "This is what I know people want me to do."
(c) "One of my friends has told me this."
(d) "I know a lot about this subject."

13. No doubt in your class you are often asked to imagine what it would be like if something occurred. In other words, we make believe or imagine. Which answer below best shows that a person is using his power of imagination correctly?

(a) he looks for what is different
(b) he looks beyond his own experience
(c) he only looks for what is new
(d) he imagines, but stays within known facts
14. Sometimes your teacher asks you to first describe something and then explain the meaning you have gotten from it. Which group of words below would most likely need to be used to accompany the meaning you will give your teacher.

(a) probably, perhaps, it seems
(b) no doubt, the facts are, I'm sure of
(c) It is clear, everything points to
(d) none of the above will do

15. Pretend you are studying about the Civil War and learning something of Abraham Lincoln. If your teacher asked you some questions, which of the following questions do you think calls for the highest level of thinking on your part?

(a) Who was the 16th President?
(b) What is meant by the word Civil?
(c) If Abraham were living today what position might he take with regard to Civil Rights Issues found in the news headlines of our time?
(d) Was Lincoln a good president?

16. A teacher asks this question of you, "If light produces change in plants, then what are some possible effects of not enough light upon man?" What does this type of question cause your mind to do?

(a) to recognize that the "If" part of the question is always true
(b) to predict an answer based on the "If" part
(c) to wish you knew more about science
(d) to seek help from other sources

17. If your teacher placed an apple on your desk and asked if there were seeds in it and since you are not to cut or bite it, which is your better answer?

(a) "It has seeds."
(b) "It has no seeds."
(c) "Likely it has no seeds."
(d) "Likely it has seeds."
18. Read these two paragraphs.

Buffalo Bill was a famous hunter. Indians taught him many hunting tricks; how to walk into the wind so it would not carry his scent toward the animals; how to put his ear to the ground to listen for stampeding buffalo; how to kill the outside buffaloes around the herd which prevents them from wanting to stampede.

The farmer has many enemies. Grasshoppers and craws are two of them. Grasshoppers live in the grass and weeds; like the farmer crows and other birds are their major enemies. The grasshopper spends much time trying to hide from birds.

What is perhaps the better answer to this question: Why are grasshopper's ears located in his abdomen? (stomach)?

19. Which one of the following is not a way in which a lizard controls his body temperature?

(a) by lying on a cool log
(b) by the way he breathes
(c) by changing color
(d) by the way he lies or faces the sun

20. Read this story.

The crab, who lives in the sea, waits for the waves to wash his food upon the sand. As the waves fall back into the ocean, the crab runs out in his slow way and looks for food. When the waves come back onto the land, the crab rests.

The crab changes color each day. He is dark in the day, and light in color at night. If you took a crab away from his friends who live on the beach, he would turn dark in color at the same time his friends turn dark who still live at the beach. A pet crab would also turn dark. If you brought a crab to school that you found on the beach, he would want to run and play and look for food at the same time his friends are so doing back at the beach.

Did this story tell why crabs change color?
21. If the color black takes in the sun's heat and makes a thing hotter than a light color then which car is likely to be cooler from the sun's penetrating rays?
(a) a car with a yellow roof
(b) a car with a green roof
(c) a car with a white roof
(d) a car with a red roof

22. A scientist said he was experimenting with lizards and the group he was now working with had high body temperatures when left in the sun at high noon. No doubt he was working with:
(a) dark-colored lizards
(b) light-colored green lizards
(c) spring lizards
(d) none of the above could be correct

23. A man living in Texas last summer remarked, "My car is always hotter than yours when I leave the windows up and to get into it on bright sunny days. No doubt his car roof is:
(a) metal and painted black
(b) cloth and painted black
(c) metal and painted white
(d) cloth and painted white

24. A boy said, "I had 10¢ and bought 2 pencils." Which statement below best answers what the pencils actually cost per pencil?
(a) the pencils cost 5 cents each
(b) the pencils cost the same
(c) there is no way of determining the cost of the pencils
(d) the present information will not yield a way of arriving at the cost per pencil/

25. How many squares are needed to complete this picture?
(a) 10
(b) 15
(c) 20
(d) 25
26. Two motorcycles are in a race. Honda A reaches its destination ahead of Honda B. Can you be sure that driver A was the fastest driver? Which is the more accurate statement?
   (a) he won the race so he was the fastest driver
   (b) both vehicles were the same so it was a fair race
   (c) vehicle B may have had motor trouble
   (d) further evidence is needed before one could determine which cycle was really faster

27. Which of the following would be most difficult to prove true or false?
   (a) The area of Alaska is greater than that of Texas
   (b) Most kids in our school have blue eyes
   (c) Good medicine always has a better taste
   (d) Sandstorms is the greatest problem in West Texas

28. Which of the following would be the most difficult to prove true or false?
   (a) A jet plane crosses the United States from east to west in about 5 hours
   (b) Some 500,000 American Indians dwell (live) in the United States
   (c) Jacqueline Cochran was the first woman to break the sound barrier
   (d) The Soviets have a global rocket which cannot be destroyed by an anti-rocket

29. ____ is as ____is to
   (a) ______  ______  ______  ______  
   (b) ______  ______  ______  ______  

30. The opposite of dull is
   (a) bold  ______  ______  ______
   (b) pale  ______  ______  ______

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31. Indians are better off today than they were before the white men came to America is (a) a fact
________(b) an opinion

32. Virginia was one of the original 13 colonies is (a) a fact
________(b) an opinion

33. The best medical care should be provided for rich and poor alike. (a) a fact
________(b) an opinion

34. A nation is justified in going to war only when attacked is (a) a fact
________(b) an opinion

35. Our world is not the same world of a hundred or even 10 years ago is (a) a fact
________(b) an opinion

36. Strikes are not fair because the public often suffers is (a) a fact
________(b) an opinion

37. No war has accomplished any good for the world is (a) a fact
________(b) an opinion

38. If cars were made to go more slowly there would be fewer accidents is (a) a fact
________(b) an opinion

39. The work of scientists usually results in the production of new products. (a) a fact
________(b) an opinion
40. Oklahoma is north of Texas is
   (a) a fact
   (b) an opinion

41. Poor people work harder than rich people.
   (a) all
   (b) most
   (c) many
   (d) some
   (e) no

42. Chinese are naturally wicked people.
   (a) all
   (b) most
   (c) many
   (d) some
   (e) no

43. People who live out in the country are better than those who live in the city.
   (a) all
   (b) most
   (c) many
   (d) some
   (e) no

44. People who live in the city consider that those who live in the country are inferior.
   (a) all
   (b) most
   (c) many
   (d) some
   (e) no

45. Things that we learn, we learn only in school.
   (a) all
   (b) most
   (c) many
   (d) some
   (e) no

46. Elementary school kids hold part-time jobs after school hours.
   (a) all
   (b) most
   (c) many
   (d) some
   (e) no

47. American soldiers are bigger and stronger than most of the soldiers of other countries.
   (a) all
   (b) most
   (c) many
   (d) some
   (e) no

48. (a) all
    (b) most
    (c) many
    (d) some
    (e) no

    persons on earth have taken a trip to the stars and moon and back.
49. (a) all  
    (b) most  
    dogs are larger than cats

50. (a) all  (c) many  
    (b) most  (d) some  
    (e) no

51. Which thing below does not go with PENCIL?  
    (a) paper  (c) chair  
    (b) desk  (d) ink

52. Be is to bee as see is to  
    (a) sea  (c) saw  
    (b) me  (d) tree

53. Gallon is to quart as bushel is to  
    (a) measure  (c) barrel  
    (b) peck  (d) pound

54. Glass is to glasses as rim is to  
    (a) spare  (c) hub  
    (b) tube  (d) tire

55. Major is to army as teacher is to  
    (a) class  (c) principal  
    (b) school  (d) PTA

56. In make-believe measures, 3 beeps equal one skim. There are 6 skims in a flip. How many beeps are there in 1 flip.  
    (a) 7  (c) 15  
    (b) 10  (d) 2

57. Which would blind people find least useful:  
    (a) telephone  
    (b) camera  
    (c) braille book  
    (d) television
58. Skate is to ice as dance is to
   ____ (a) couple  ____ (c) music
   ____ (b) stage  ____ (d) floor

59. Bobby, who had a cold, stayed for ball practice _____
    the coaches desire that he go on home.
   ____ (a) because of
   ____ (b) in spite of
   ____ (b) to follow
   ____ (d) to deny

Hydras live in ponds. Ponds are called tanks in Texas. Tanks
hold water. People cannot grow extra parts like hydras. It
is strange how a hydra can be cut in two parts and each part
then grows into a new hydra. Once a scientist understands
what makes hydras grow, he will know more about how people
grow.

60. This is a story about _____
   ____ (a) people  ____ (c) scientists
   ____ (b) doctors  ____ (d) hydras

61. People differ from hydras in that they cannot:
   ____ (a) swim
   ____ (b) live in tanks
   ____ (c) grow extra parts
   ____ (d) benefit scientists

62. Ponds are to tanks as cans are to _____
   ____ (a) containers
   ____ (b) jars
   ____ (c) boxes
   ____ (d) food

63. ____ (a) What were the causes of the Civil War?
    ____ (b) Who is our current President?
    ____ (c) Can man live on the moon?
    ____ (d) Under what conditions might man live on
          the moon?
    Which of the above is a more critical type of question?
64. Here is a simple code - B U, WHAT IS T I J O?

A T

(a) hall  (c) ship

(b) bowl  (d) moat

65. Break this code N J E O J H I U.

(a) buffaloe  (c) touching

(b) hunted  (d) midnight

Fred, a good swimmer and diver, saw a sign at a pond edge
which said: "Average depth, 8 feet." He reasoned that it
would be safe for him to practice diving there.

66. What assumptions did Fred overlook?

(a) there may be snakes in the water

(b) old junk may be below the water surface

(c) there may be a very deep hole somewhere

(d) all of these assumptions may have been

(e) none of these are worth considering

67. Mary, a non-swimmer saw a sign that read, "Average depth,
4 feet." She is 42 inches tall, which is the better
judgment?

(a) she would not wade in this pool

(b) it is alright to wade in this pool

(c) wade, but suffer the consequences

(d) wade only if any adult is there to assist her

68. If you have read 3 good stories by an author and eagerly
seek out the fourth, what assumption are you making?

(a) the next story will be a good one

(b) the next story likely will be a good one

(c) beyond all doubt the next story will be a
good one

(d) you will like all of his author's stories

69. baseball, softball, football, tennis, soccer
The words above can best be classified under one heading
as:

(a) games

(b) experiences

(c) indoor games

(d) outdoor games
70. Do you see any order in which these words could be best placed?
   1. cat  2. catlike  3. kitten  4. feline
   5. kitty-cat
   (a) 5, 2, 1, 3, 4  (b) 3, 1, 2, 4, 5  (c) 2, 1, 3, 4, 5  (d) 4, 1, 3, 5, 2

71. How many boxes do you see?
   (a) 9  (b) 8  (c) 14  (d) 10

Study this set of circles.

72. Check one answer only.
   (a) circle a is larger  (b) circle b is larger  (c) both circles are the same size
   (d) impossible to know

73. Without measuring, which is longer or shorter.
   (a) 1 is shorter  (b) 2 is shorter  (c) both the same length
DIRECTIONS FOR TEST: Choose the best answer.

Do not write on this test booklet since a separate answer sheet will be provided for you.

Red flams leaping up
burn the building to the ground
Cigarettes flicked down.

1. This is:
   (a) creative or original thinking
   (b) memorizing
   (c) seeing likeness and differences
   (d) sorting ideas into some order according to some rule

2. What are these?
   1620, 1775, 1918, 1971
   (a) numbers
   (b) unknowns
   (c) facts about our history
   (d) arithmetic problems

A teacher ask her class to look at a film while the sound was off and then to tell what they saw.

3. What type of thinking is this teacher helping her children learn to use?
   (a) guessing
   (b) remembering
   (c) observing
   (d) summarizing
4. If the teacher asks you to read one page of printed lines that contain a story and then asks you to write one paragraph about what you read, this is an experience in:
   (a) finding facts
   (b) recalling information
   (c) briefly stating (writing) what has been presented
   (d) listing details

5. A teacher gave each child a grasshopper and told them to watch and record exactly what it did. This is an experience in:
   (a) observation and recording of facts
   (b) making assumptions
   (c) describing
   (d) noticing and seeing

6. A pupil was handed an orange and a lemon and then asked to compare the two fruits. What was he doing as a thinking act?
   (a) looking for likenesses
   (b) looking for differences
   (c) looking for both likenesses and differences
   (d) choosing things that have apparent relationship to one another

7. If your teacher asks you to arrange a series of ideas into some category or group - such as if you were asked to list the ideas under two headings -- IDEAS I LIKE BY; IDEAS I DON'T AGREE WITH, what type of thinking activity are you doing?
   (a) seeing relationships
   (b) classifying items
   (c) making arrangements
   (d) setting up of the categories

8. A pupil was asked to place information in a pattern from the best idea down to the poorest ideas. What thought skills was being used?
   (a) collecting information
   (b) presenting information
   (c) organizing information
   (d) looking for information
9. A person who does critical thinking recognizes that some of his ideas are based on the best information available; therefore, he treats his ideas as:
   (a) assumptions (guesses)
   (b) worthwhile
   (c) being true
   (d) facts

10. "All bees are insects" said the teacher. If you agree that this is true, which of the following is most correct?
   (a) Some bees are insects.
   (b) All insects are bees.
   (c) Some insects are bees.
   (d) One-half of all insects are bees.

11. If someone asks you to "criticize" a piece of work, your school, or an art picture, he is probably trying to get you to:
   (a) tell why you like it
   (b) tell why you don't like it
   (c) tell what you like and to give reasons why you like it
   (d) tell what is wrong with the piece of work

12. When one makes a decision he uses his own feelings, beliefs, attitudes, or thoughts which he likes. Which statement below tells whether or not a person likely made his own decision?
   (a) "I read this in my own school book."
   (b) "My closest friend told me this."
   (c) "I cannot go along with you on that because..."
   (d) "How do you know?" "I know more than you on this subject."

13. Which below is the best answer as a definition to the word, imagination?
   (a) looking for some ideas which goes beyond one's own real life experiences
   (b) looking to see what is different
   (c) reading comic books and pretending you are a part of the story
   (d) dream a little, but stay within the facts as people know them
14. The more a person knows the more he will use such words as:

_____ (a) there is no doubt, the facts are, I'm sure of
_____ (b) if my information is right, it seems that, likely
_____ (c) this is the way it is, it is definitely proven that
_____ (d) none of the above will do

15. Pretend you are studying about the moon in science class. If your teacher asks some questions, which of the following questions do you think calls for the highest level of thinking on your part?

_____ (a) Does the moon control the tides?
_____ (b) Where does the moon get its name?
_____ (c) In what way is the earth affected by the moon's gravitation?
_____ (d) Is there life on the moon?

16. A pupil was asked this question, "If paper is produced from wood pulp, what effect will forest fires have upon the cost of paper?" What does this type of question cause your mind to do?

_____ (a) to want help from other sources
_____ (b) to wish you had read more about trees, paper, and prices
_____ (c) to recognize that the "If" part of the question is always true and there is information enough to figure out the answer
_____ (d) to recognize that the "If" part, if it is true, provides enough information to figure out the answer.

17. A teacher placed a green colored apple on a pupil's desk and asked if it were ripe. Since he was told he could not bite it, cut it, or feel of it, which is the better answer?

_____ (a) "It is green, therefore it is not ripe."
_____ (b) "Some apples are red when ripe, some are ripe when green."
_____ (c) "It looks ripe."
_____ (d) "If you leave it a longer period of time it will turn red and then will be ripe."
18. A grasshopper's ears are located on his stomach probably so:
   (a) he won't get water in them when it rains.
   (b) so he can see better
   (c) so he can hear the bird or other enemy slipping up on him in the grass
   (d) none of the above answers are correct

19. Which of the following is a way that a lizard can control his body temperature:
   (a) by sleeping and relaxing
   (b) by changing color
   (c) by moving only at night time
   (d) he really cannot control his body temperature

20. If you caught a crab out of the ocean and brought him to your own hometown for observation what would he do that was like what his fellow crabs would do back at the ocean?
   (a) get hungry
   (b) want to swim
   (c) try to get away
   (d) change color at the same time other crabs do back at the beach

21. If you were buying a car in which to keep cooler during the summer, which color of roof would you get?
   (a) a car with a black roof
   (b) a car with a red roof
   (c) a car with a green roof
   (d) a car with a white roof

22. A man said I must stop plowing my garden at high noon for my horses seem so much hotter than my neighbor's horses who is plowing across the fence in the next garden. No doubt the man who had the hottest horses was plowing with ________ horses.
   (a) grey
   (b) brown
   (c) white
   (d) black
23. Fred Brown goes to work in a 25-floor office building. Each morning he gets in the elevator, presses the button marked 19, rides to the 19th floor, and then he walks up the stairs to his office on the 23rd floor. At night he enters the elevator on the 23rd floor and rides down to the lobby. Why does he ride only to the 19th floor in the morning?
   ______ (a) there is construction on the 20th floor and he can't go all the way
   ______ (b) extreme heights make him sick
   ______ (c) he is a very short man
   ______ (d) he likes to walk part of the way

24. A pupil said, "I have a dollar and a-half ($1.50) I will take you to a movie and buy you a small coke. Likely the movie cost ______ a piece.
   ______ (a) 80 cents
   ______ (b) 70 cents
   ______ (c) 60 cents
   ______ (d) 40 cents

25. How many more pieces are needed to complete this picture?
   ______ (a) four
   ______ (b) six
   ______ (c) three
   ______ (d) nine

26. A person is stranded on an Island and has a radio which will transmit for only one minute. Whom should he call from this list?
   ______ (a) His parents
   ______ (b) Coast guard, radio section
   ______ (c) His best friend
   ______ (d) An airplane pilot

27. Which of the following would be most difficult to prove true or false?
   ______ (a) Most boxers are well trained
   ______ (b) Texas is larger than Missouri
   ______ (c) Drought causes a rise in food prices
   ______ (d) All birds fly South for the winter
28. Which of the following would be most difficult to prove true or false?
   (a) George Washington was our first President.
   (b) The Eagle is a symbol for the United States.
   (c) American people are becoming smarter.
   (d) Chain stores sell products cheaper than small businesses.

29. is to as is to
   (a) △ as △ is to (c)
   (b) □
   (d) △

30. The opposite of hate is
   (a) mean (c) sad
   (b) soft (d) love

31. Different racial groups (Spanish, Negroes, Indians) are better off today than they were last year is
   (a) a fact
   (b) an opinion

32. Texas is known as "the Lone Star" State is
   (a) a fact
   (b) an opinion

33. All dogs should be given rabie shots is
   (a) a fact
   (b) an opinion

34. Man cannot live without a lot of money is
   (a) a fact
   (b) an opinion

35. Bumble bees are larger than honey bees is
   (a) a fact
   (b) an opinion

36. Soap cleans a painter's hands better than paint thinner is
   (a) a fact
   (b) an opinion
37. If more kids had a driver's license test to drive a minibike there would be fewer accidents is 
   (a) a fact 
   (b) an opinion

38. If we had more doctors there would be fewer deaths is 
   (a) a fact 
   (b) an opinion

39. A person living in Africa can stand the heat better than a Texan is 
   (a) a fact 
   (b) an opinion

40. The giraffe is the tallest of existing animals is 
   (a) a fact 
   (b) an opinion

41. Bicycles are blue. 
   (a) all 
   (b) most 
   (c) many 
   (d) some 
   (e) no

42. Alien ideas should be kept out of the United States. 
   (a) all 
   (b) most 
   (c) many 
   (d) some 
   (e) no

43. Fishermen are happier than most people. 
   (a) all 
   (b) most 
   (c) many 
   (d) some 
   (e) no

44. White horses can run faster than black horses. 
   (a) all 
   (b) most 
   (c) many 
   (d) some 
   (e) no

45. Poor people are more honest than rich people. 
   (a) all 
   (b) most 
   (c) many 
   (d) some 
   (e) no
46. People believe it is all right to break the law.
   (a) all (c) many (e) no
   (b) most (d) some

47. Football players eat more food than do basketball players.
   (a) all (c) many (e) no
   (b) most (d) some

48. (a) All (c) Many (e) No
    (b) Most (d) Some
    School persons have taken a smallpox vaccination at one time or another.

49. (a) All (c) Many (e) No
    (b) Most (d) Some
    Birds fly backwards.

50. (a) All (c) Many (e) No
    (b) Most (d) Some
    Kids watch television 4 to 6 hours a day.

51. Which thing below does not go with PAPER?
    (a) tree (c) book
    (b) pulp (d) leather

52. Tea is to tea as flea is to
    (a) me (c) flee
    (b) see (d) tree

53. Dozen is to case as keg is to
    (a) box (c) pound
    (b) barrel (d) can

54. Rod is to mile as inch is to
    (a) square inch
    (b) knots
    (c) yard
    (d) foot
55. Captain is to navy as ___ is to business.
   (a) man  (c) major
   (b) boss  (d) clerk

56. Television commercials are true.
   (a) all  (c) many  (e) no
   (b) most  (d) some

57. Which would short people find least useful?
   (a) ladder  (c) stilts
   (b) cane  (d) high heels

58. Boxing is to fights as jumping is to
   (a) running  (c) track
   (b) football  (d) swimming

59. Mary, who was wearing glasses, was able to hit basketball goals ___ it was difficult for her to see.
   (a) because  (c) altogether
   (b) however  (d) although

60. ___ Looking at things--observing
   (b) Going beyond the real world--imagining
   (c) Looking for relationships--comparing
   (d) Making wise educated guesses--hypothesizing
   Which of the above is a more higher level of thinking?

61. If the code equals dear is read, then pear means ___
   (a) sleep  (c) ear
   (b) bear  (d) reap

62. Here is a simple code-- B U, what is T I J Q?
   (a) bowl
   (b) help
   (c) ship
   (d) goat

63. Can you break this code N J E O J H I U?
   (a) hunted
   (b) buffaloe
   (c) midnight
   (d) catching
64. Jim, who wanted to mow lawns for some spending money, saw a sign in a window which said, "LAWN MOWER FOR SALE, $25.00." He had $25,00 so went in to purchase it but he left the store without the mower. What can one hypothesize as a more accurate answer?
   (a) when he looked closely at the mower he changed his mind.
   (b) the man thought he was too young to mow.
   (c) the advertisement is really not true.
   (d) you must have a parent with you to purchase a lawn mower.

65. wheat corn oats barley
The words above can best be classified under one heading as:
   (a) hay     (c) food
   (b) grain   (d) products

66. Without measuring, which is longer?
1
2
(a) 1 is shorter
(b) 2 is shorter
(c) both are the same length

67. How many triangles can you find in this triangle bird?
   (a) 8
   (b) 4
   (c) 16
   (d) 32
68. Which is larger, 1 or 2?
   (a) 1 is larger
   (b) 2 is larger
   (c) both the same size

69. How many triangles in this picture?
   (a) 12
   (b) 18
   (c) 24
   (d) 28

70. One of these sentences does not have the same meaning as the other three. Which sentence means something else?
   (a) Some people go camping for silence (quietness)
   (b) The woods is generally considered to be a quiet area.
   (c) Lots of people have pick-up campers.
   (d) A city of loud noises makes one want to seek a silent area.
71. What thought skill does a weather man use the most when he reads his weather maps for a report about the weather at new's time on television?
   (a) observation
   (b) making inferences
   (c) assumption making
   (d) critical thinking

72. A boy brought a large shell to school that he found at the ocean's edge. When he put it to his ear he heard a roaring sound. What sound was he hearing?
   (a) the captured roar of the ocean
   (b) air moving
   (c) molecules bouncing back and forth against the inside shell walls
   (d) wind whistling within the shell as it rushes in and out

73. One set of soft, plain, unchanged white marshmallows like those you roast over an open fire were mixed with another set of white marshmallows which had been sprinkled with powered alum and placed on a tray. One pupil, when the marshmallows were about to be passed out, said, "I know what they are because they look alike and taste alike; they are marshmallows." However, when they were passed along the line, he got one of the bitter tasting marshmallows and a strange look passed over his face. What had he done in his thinking process?
   (a) had done critical thinking
   (b) used his observation skill real well
   (c) made a false assumption
   (d) used his imagination skills
APPENDIX C

CURIOUSITY INVENTORY TEST
*(Adopted from Frymier)*

FORM I

Name __________________________ School __________________
Date ________  Boy ________  Girl ________  Room ________

We are trying to find out how students think and feel about a number of important topics. In order to do this, we would like to ask you to answer some questions. This is not an intelligence test nor an information test. There are no "right" or "wrong" answers. The best and only correct answer is YOUR PERSONAL OPINION. Whatever your answer is, there will be many who agree and many who disagree. What we want to know is HOW YOU FEEL.

Read each statement very carefully and then indicate your agreement or disagreement by marking it according to the following scales on your answer sheet.

+1 Slightly support, agreement
+2 Strong support, agreement
-1 Slight opposition, disagree
-2 Strong opposition

1. Most children like to watch television.
2. Many books written for children don't have a real point to them.
3. Pupils should listen to their parents.
4. It is more important for the teacher to be kind than to be right.
5. The best way to spend a free evening is with a good book.
6. Some of the best books do not have pictures in them.
7. Some teachers make reading as a subject more interesting than others.
8. There are much more important things at school than only learning to read.
9. Some pupils could learn to read if they would only try.
10. Being a good reader is just as important as being a good computer in arithmetic.
11. Most pupils get nervous before they read orally.
12. Learning to do workbook exercises is just as important as reading itself.
13. Most pupils who cannot read do not really want to.
14. Some people do not see much value in going to school.
15. Most young people feel uncomfortable in a class if they cannot do what is expected of them.
16. A great many teachers do not show much concern for the feelings of their pupils.

17. Teachers do not usually practice what they preach.

18. Poor people are generally unhappy people.

19. Pupils who don't attend school regularly should not pass.

20. Listening to a good television program is the best way to learn.

21. Most pupils are too young to know what is good for them.

22. The better one understands himself, the better he can understand others.

23. Reading is more fun when teachers let students read what they want to.

24. Pupils should try to get good grades in reading even if they have trouble with it.

25. Successful school kids are those who read the best.

26. Most young kids do not want to read.

27. Some new ideas in reading are interesting, but most of them are not.

28. Being able to understand what someone else reads is more important than being able to read yourself.

29. Many young people feel sad most of the time.

30. The best readers in school refuse to depend on help from their teachers or parents.

31. A person's feelings on a topic he is reading are not as important as the facts.

32. It does not really help to read about new ideas that occur in the world.

33. Reading is mostly work with little reward and joy coming from it.

34. Many youngster want to stay away from reading; not reading any more than they just have to.
35. Some teachers seem to enjoy making kids read.
36. Our whole trouble with learning to read is that no one will help us.
37. No one seems to understand my problems of reading.
38. Most kids would like school better if teachers did not give reading assignments.
39. The world we live in is a pretty lonesome place.
40. Likely I will only make reading progress if someone helps me.
41. It is very foolish for the teacher to expect me to read by myself.
42. There is nothing new in what I read anyway, so why read it.
43. Life to me is one struggle after another.
44. Most people don't care about others.
45. The best way to achieve a good job is to learn how to read well.
46. Many new ideas I read are not worth the paper they are printed on.
47. It is better not to read if one is going to forget it.
48. Young kids should be allowed to read what they want to.
49. Most of what one chooses to read day by day is full of happiness.
50. People who read a lot at night don't use their time wisely.
51. Reading is hard, therefore one should not read too much.
52. There is a real limit as to what one has time to read.
53. People who read generally can't do much else.
54. Reading may be good for one, but a good teacher doesn't expect you to read very much.
55. People who read a lot generally jump to conclusions to quickly.

56. Most people don't read very much until they grow up.

57. Reading is to learn is just as important as listening to learn.

58. Famous people are generally good readers.

59. Most people cannot learn from books as well as they can from personal experience.

60. The person who reads a whole lot is a danger to society.

61. Wasting time and energy is worse than wasting money.

62. Most people are unhappy because they don't have anyone to listen to them.

63. One feels best about what he learns if he teaches it to himself.

64. One should only ask his teacher for help if he really needs it.

65. It is hard to take in ideas which differ from your own.

66. Some pupils set out to hurt themselves more than to hurt others.

67. Everybody ought to find something to be happy about everyday.

68. Most teachers like to drive children to read every chance they get.

69. Reading all too often can do you more harm than good.

70. Not reading something because it is hard for you is better than reading when you have to figure something out since you might arrive at the wrong answer.

71. Asking questions about reading when you don't understand it usually gets one into trouble someway.

72. Not many people in the world are really good readers.
73. Teachers make their kids read more than they read themselves.

74. Reading is no better way of learning than some other methods I know.

75. Reading is not all what it's cracked up to be.

76. Everything that people read is either right or wrong.

77. Reading quickly is always more important than reading slowly.

78. Reading will not really make anyone happier.

79. All of those who fail to do a good job in reading will probably fail to become "good thinkers."

80. Being right is more important than being liked by everyone.
APPENDIX D

CURIOSITY INVENTORY TEST
*(Adopted from Frymier)*

**FORM III**

Name ___________________________ School ____________

Date ___________ Boy _______ Girl _______ Room _____

We are trying to find out how students think and feel about a number of important topics. In order to do this, we would like to ask you to answer some questions. This is not an intelligence test nor an information test. There are no "right" or "wrong" answers. The best and only correct answer is YOUR PERSONAL OPINION. Whatever your answer is, there will be many who agree and many who disagree. What we want to know is HOW YOU FEEL.

---

Read each statement very carefully and then indicate your agreement or disagreement by marking it, according to the following scale on your answer sheet.

+1 Slight support, agreement
+2 Strong support, agreement
-1 Slight opposition, disagree
-2 Strong opposition, disagree

1. Late afternoon is the best time of the day.
2. Many children have often been punished without cause.
3. Students should be made to go to school until they are 18 years old.
4. Being right is more important than being kind.
5. School is more fun when teachers let students do things they want to do.
6. Pupils who try should get good grades even if they make mistakes.
7. Successful people are those who make the most money.
8. The best way to spend a free evening is with a good book.
9. Most young people do not want to go to school.
10. Some new ideas are interesting, but most of them are not.
11. Practical people are usually highly respected.
12. Knowing the answer is more important than knowing where to get the answer.
13. Many young people feel grouchy.
14. The best people refuse to depend on other persons.
15. Some teachers make school more interesting than others.
16. A person's feeling on a topic are not as important as the facts.
17. There are more important things in the world than making money.
18. It does not help much to study about people from other lands.
19. Life is mostly sorrow with just a little joy.
20. Some students have to study more than others.
21. Many youngsters often want to run away from home.
22. Being a good speaker is just as important as being a good speller.
23. Some teachers seem to enjoy making students suffer.
24. Our whole trouble is that we won't let God help us.
25. Most people worry more before they take a test than during the test.
26. No one seems to understand young people.
27. Learning to cooperate is more important than learning to compete.
28. Most people would like school better if teachers did not give grades.
29. The world we live in is a pretty lonesome place.
30. Social progress can only be achieved by returning to our glorious past.
31. It is very foolish to advocate government support of education.
32. Most people's hardest battles are with themselves.
33. There is nothing new under the sun.
34. Helping other people is the key to happiness.
35. Life seems to be one big struggle after another.
36. Most people just don't give a "darn" about others.
37. The best way to achieve security is for the government to guarantee jobs.
38. Some people do not appreciate the value of an education.
39. Most young people feel uncomfortable around someone of the opposite sex.
40. Many new ideas are not worth the paper they are written on.
41. Many teachers are not considerate of students' feelings.
42. Teachers are generally underpaid.
43. Being unhealthy is worse than being unhappy.
44. It is better to forget than to forgive.
45. Pupils who copy during an examination should fail.
46. Young people should be free to follow their own desires.
47. Listening to a good speaker is the best way to learn.
48. The present is all too often full of unhappiness.
49. Most people just don't know what is good for them.
50. Understanding yourself helps one to understand others.
51. People who dream a lot at night are apt to be crazy.
52. Familiarity breeds contempt, so one should never be friendly.
53. There is a real limit to man's intelligence.
54. People who are insulted generally deserve to be.
55. Experience may be a good teacher, but schools are better.
56. Wasting time is even worse than wasting money.
57. People who are quick thinkers usually jump to conclusions.
58. Most people do not have good ideas until they grow up.
59. When people are unhappy, they should talk to someone about it.

60. Looking good is just as important as being good.

61. The best part of education is that which people teach themselves.

62. Famous people usually have a lot of money.

63. Most people cannot learn from the experience of others.

64. The dreamer is a danger to society.

65. Most teachers like to drive students if they have a chance.

66. God helps those who help themselves.

67. One can never desire too much of a good thing.

68. Being a liar is better than being a gossip.

69. Asking questions usually get you into trouble.

70. Not many people in the world are really kind.

71. The biggest part of being successful is determinations.

72. Teachers know more and do less than most other people.

73. Hope is really no better than worry.

74. School is not all that it is cracked up to be.

75. Everything that people do is either right or wrong.

76. Quick thinking is always better than being polite.

77. We are really never happy as we think we are.

78. All of those who have failed have worked in vain.

79. Everybody ought to do something worthwhile everyday.

80. The gentle person often treats himself severely.
APPENDIX E

EXPERIMENTAL THINKING PROCESS GUIDE

Dr. R. C. Bradley

The following information may be helpful in extending the use of the information placed in each of the Reading Comprehension Skill Kits. Each of the thought processes for this experiment are identified and suggested procedures are given for presentation of the information found on the cards.

1. APPLYING FACTS AND PRINCIPLES IN NEW SITUATIONS:

Your cards give situations. You are to describe a situation and then ask the student to predict the outcome in given circumstances. In some instances the child is asked to solve a problem. For each instance cite the information that the child is to apply and then give him the new situation.

E.G. Situation needing solution. We want to give two candy canes to each of the children in this group. Data given: 30 children. Ask, "How many candy canes do we need? How do you get that? How do you know you are right?

E.G. Situation given. You have three colors with which to paint a picture, Yellow, Blue, Red. What do you think will happen when yellow and blue are mixed? Red and blue? If you guessed correctly what were the reasons for your predictions? Generally, instruction stops when we receive an answer to the question. But in this work we would like you to extend a child's learning to answer this question. "Why do you think so?" That is, what would happen when you drop a magnet into a box of tacks? Why do you think so? In the course of teaching seek to correct all notable misconceptions.

2. ASSUMING. In this activity we need to help the child understand that to make an assumption is not necessarily wrong but that we want them to know that an assumption is being made. We look at an orange and say it is "orang" in color. This is clearly observable. Some assumptions are based then upon strong bits of evidence. However, when we look at an orange and say it is "seedless" or that it "has seeds" the strength of evidence becomes less. That is to say, one might look at an apple and say, "It has seeds." We cannot see the seeds but it is a reasonable assumption that it does
have seeds recognizing the possibility that this may not be so. Moreover, to look at an apple and to say that all apples are read is to make a rather broad assumption. When cards are used dealing with assumption making, seek to find out how the support for his statements and beliefs about the situation.

E.G. Two cars are in a race. Car one reaches the end of the race ahead of car two. Can we conclude that Car one is faster? (Perhaps car two had a flat. Pupils are lead to see that Car one being believed faster in one's choice as an assumption. Pupils are taught to recognize that further evidence would be needed before one could determine which car was really faster.

3. CLASSIFYING: Children who respond to these cards are being asked to arrange a variety of items according to categories or groups. The child is learning to see distinct relationships among ideas and concrete items. Discussion centers upon how to set up categories rather than on placing the objects into established groups. An important element that children learn is that setting up groups must be done with selected purposes in mind. Ask the pupil to reveal why he has made those groups. Are there other groupings just as significant (important.) He learns that his purpose determines the nature of his categories.

E.G.: If a list of words were given (ball, drum, wagon, eggs, cake, sled, nuts, hat, muff, apple, dress, mitten) the pupil might be asked to determine the categories under which these words might be appropriately placed (we eat; we put on; we play).

4. COLLECTING AND ORGANIZING DATE: Cards of this type are used to help a pupil seek logical pattern, sequence, and informational arrangement. For determining if a child can see the sequence of events the teacher asks, "What is the first thing you want to tell?" "What should come next?" "What order should these things be placed in to tell a story?"

E.G.: Trace the movement of the planting of seed potato to its final placement in a can. Or, ask the pupils to enumerate the steps involved in making of butter and place what they find into a step-by-step outline.

E.G.: Pictures of buildings in a community can be used to show which came first. Or, recreation can be organized by the seasons. Use of numbering systems, alphabetizing, and sizes and weights can be used to show how things are organized for various purposes. Therefore, the pupil who responds to these cards is learning something of the collection and organization of data, a system used quite often in our society.
5. COMPARING: Through the use of these cards the pupils are learning to understand what steps are involved in making accurate comparisons. First, there is the element of observing, of noting details. Then, there is a mental sorting of these details, so that both similarities and differences of the objects being compared are noted with respect to their influence on one's interpretation to a question.

E.G.: If a child responds, "An 11 year boy in Marshall is more civilized than an 11 year boy in Congo," the teacher should not judge these comparative points right or wrong, but only question for additional evidence. That is, "What else can you think of that is different about the activities of a boy in the Congo and one in Marshall?" "What is similar about the family structure of a Congolese and a Marshall boy?" Moreover, searching for likes and dislikes makes food for thought for comparative purposes.

6. CRITICIZING: The pupil is taught that criticizing is not mere fault finding or censuring. These cards are used to help the pupil see the basis for any criticisms that he chooses to make. After a child criticizes a picture, object, or idea, it is well to ask for his evidence to support his comments. When the child examine his reasons for feeling that way. Say, "Why do you like it?" "Why do you think that isn't good?" If the pupil says, "I don't know," follow with, "You like this, but you really don't know why you do. Is that right?" The child may pursue the question further. Indeed, the teacher may want to respond, "Do you not like the picture because it is not colored?" Not only is the purpose here to help children criticize, but to do so with good judgment and to find a basis for supporting what they are saying negatively or positively.

7. HYPOTHESIZING: The primary purpose of these cards is to lay a basis for a discussion which involves helping pupils to understand and consider the variety of possibilities which may be involved in arriving at the explanation of a phenomenon. They are being taught that an hypothesis is an educated guess, a reasonable possibility—a tentative explanation of something they have observed or have been told about. Moreover, they will find that in some instances more than one hypothesis may provide an appropriate explanation of a given phenomenon.

E.G.: Fred did a problem involving addition. It was a three column figure of 8 rows of numbers. His answer was incorrect. What do you think the trouble might have been?
   a. It might be that he gorgot to invert the divisor.
   b. Perhaps it is that he was feeling ill and could not think clearly.
   c. Maybe Fred was not taught how to do this.
   d. He may not have read his problem clearly.
As the teacher works with these cards, she should be ready to accept any reasonable possibility offered by the children as an hypothesis. Thus, the more hypotheses given about each card and the more discussion, the more likely children can arrive at the feasibility of selecting one hypothesis over another. In any event, consideration must be given to analyzing those hypotheses that are most worthy of being further tested.

8. IMAGINING: These cards are used to allow a child to enjoy thinking in a fanciful world -- he can be what he wants, take an imaginative trip, and go beyond the real world. In so doing, however, he must ponder on what his real world is about and why he likes to leave it in thought. In these card experiences the teacher asks the pupils to fancy freely what they would do if...."What if today were a day in which electricity did not work?" "If you owned a cadillac, what would you do?"

9. INTERPRETITING: The information on these cards deals with ways of deriving meaning from children's experiences. When children are asked how they got that particular meaning from an experience, they are being asked to give supporting details in defense of their interpretations. Consequently, these cards can be used to judge whether: (1) the data of the experience supports the interpretation; and (2) whether or not a generalization is being made on the basis of insufficient evidence. Maps, charts, graphs, illustrations, photograph, and the like are used for these purposes.

It should be remembered that the data given on the card must support the interpretation. Discussions should center upon the data on the card: however, extension of information can be provided by going beyond the evidence in the illustration wherein time permits. In the stories provided, the pupils should be asked to check their verbal statements against the facts in the story (or picture) to see if the data support the interpretation.

10. OBSERVING: Cards are provided for the accumulation of facts as a means to a general intellectual conclusion, not for the accumulation of isolated facts only. When pupils view and discuss these cards, they are getting practice in noticing and describing. The teacher is to help them differentiate between what actually was observed and any assumptions made from the observation. Say, "What made you say that?" "Are you sure that was shown on the card?" "Did you read something else into the idea?" "What might have caused you to believe that was on this card?" "Name once again exactly what you saw."
11. RECALLING: Cards illustrating this thought process are shown or read and the pupils are asked to respond to the questions written on the back of the cards. Pupils are experiencing listing, naming, and bringing forth from memory something learned previously. We are dealing here with immediate recall. However, some cards are made to be introduced later in the study which then causes children to rely on information learned earlier in the study. Recall is generally based on the pupil's attentiveness to what was being viewed in the first place. After observing, a pupil usually reports. The teacher should seek to discover the accuracy of the report. Therefore, what was once observed must be recalled. Checking perceptions (Perceivings) is much easier than checking recollections (rememberings). Consequently, these cards are used to increase memory span. The child is helped to discover an individual system that he might use in recalling information at a later time. The teacher says, "What can you do to remember this information?" "What is it that is important about this?" "Do you have a way of remembering this?" "What ideas go together that might help you remember this?" "What is strange about this idea?" "What is helpful about this idea?"

12. SUMMARIZING: These cards are used to help students learn how to determine what is significant and what is not, what is relevant and what is not, what is pertinent and what is not, what is essential and what is not. Consequently, the teacher presents card experiences which help him to synthesize material, determine what is important, and then to restate the essential points in a meaningful and sequential verbal presentation.

E.G.: A story is read, and a student tells the real meaning in one sentence. A series of pictures are shown, and a student tells in two or three sentences the summary ideas of the sequence. Hence, these cards can be used to present broad ideas, but the students are expected to restate only the gist of the matter, or the big idea or ideas. The teacher should seek and obtain conciseness without the omission of important points. When likenesses and differences are considered, a series of specifics must be considered. This training in sensitivity to what goes together, what is relevant and what is irrelevant, what is of greater or lesser significance, is a contribution to the development of discrimination of what should go into summary thinking.
Mr. George H. Chandler, Academic Dean
Wiley College
Marshall, Texas 75670

Dear Mr. Chandler:

Pursuant to your request for consideration for use of the Marshall Public Schools as a laboratory for your dissertation study, I am pleased to grant you the opportunity to conduct your experiment as described in your communication.

I have informed the principals of the schools you have requested as participants that you will be contacting them to arrange time schedules and to meet the teachers of the sixth grade classes.

Please know that we wish you success with your project and that we are looking forward to hearing about the results.

Sincerely yours,

Truitt Ingram, Superintendent
APPENDIX G

TABLE XLIV

VARIABLES, SECTION, MEAN GAIN COMPUTED T VALUE RELATING TO MEAN GAIN IN ACHIEVEMENT MENTAL ABILITY, THOUGHT SKILLS AND CURIOSITY DURING THE EIGHTEEN WEEKS OF THE INVESTIGATION

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*Significant at or beyond the .05 level

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APPENDIX H

SPECIFIC HYPOTHESES RELATING TO MEAN GAINS
IN THE TOTAL TEST SCORES

1. There will be no significant difference between the mean gains in the total test scores on Word Meaning of Group I, Experimental and Group II, Control on the Stanford Achievement Reading Test, Intermediate II, Forms W and X.

2. There will be no significant difference between the mean gains in the total test scores on Paragraph Meaning of Group I, Experimental and Group II, Control on the Stanford Achievement Reading Test, Intermediate II, Forms W and X.

3. There will be no significant difference between the mean gains in the total test scores of Group I, Experimental and Group II, Control on the Otis-Lennon Mental Ability Test, Forms J and K.

4. There will be no significant difference between the mean gains in the total scores of Group I, Experimental and Group II, Control on The Bradley Thought Skill Test, Forms I and II.

5. There will be no significant difference between the mean gains in the total test scores of Group I, Experimental and Group II, Control on the Curiosity Inventory Test, Forms I and II.
Findings on these five hypotheses which were tested by employment of the analysis of covariance are summarized as follows:

**Hypothesis 1:** There was significant mean gains in the total test scores on Word Meaning in favor of the Experimental Group who show a gain of 10.678 in contrast to a gain of .741 points in the Control Group. The hypothesis was rejected. The gain strongly suggests that the employment of thought skill procedures in the classroom improves responses to questions on standardized test as opposed to regular classroom procedures.

**Hypothesis 2:** There was significant mean gains in the total test scores on Paragraph Meaning in favor of the Experimental Group who reveal a gain of 9.288 in contrast to the loss of 0.344 points by the Control Group. The hypothesis was rejected. Support is given to the procedures of the experimental program when compared to the gains made by students following regular classroom procedures.

**Hypothesis 3:** There was significant mean gains in the total scores on Otis-Lennon Mental Ability Test in favor of the Experimental Group who reveal a gain of 1.45 in contrast to the gain of 0.39 in the Control Group. The hypothesis was rejected. The significant difference indicates the strength of the experimental program using selected questioning procedures over regular classroom procedures.
Hypothesis 4: There was significant mean gain in the total test scores on the Thought Skills Experimental Group who reveal a gain of 7.15 as opposed to a gain of 0.72 by the Control Group. The hypothesis was rejected. The significance indicated the strength of the experimental program using thought skill procedures over regular classroom procedures.

Hypothesis 5: There was significant mean gains in the total test scores on Curiosity Motivation in favor of the Experimental Group who reveal a gain of 4.58. The Control Group regressed 4.37. Inspection of the gain and regression figures tends to give credence to the experimental program as applied to black sixth grade students.

The analysis of covariance which was applied to test the significance of the mean gains reveals that students of the Experimental Group performed better than the Control Group in responses made to questions on standardized and experimenter made test.

In each hypothesis, the evidence suggest that a well organized program of thought skill questioning may have a strong effect upon the responses of black sixth grade students to standardized test. Students who are subjected to regular classroom procedures with no special help provided appear to not make significant gains as students exposed to a program rich in high level questioning procedures.
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