CURIOSITY IN THE READING ENCOUNTER, AN EXPERIMENTAL STUDY OF THE EFFECT OF SELECTED QUESTIONING PROCEDURES ON CURIOSITY AND ON READING COMPREHENSION

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CURIOSITY IN THE READING ENCOUNTER, AN EXPERIMENTAL STUDY
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ON CURIOSITY AND ON READING COMPREHENSION

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CHAPTER I

INTRODUCTION

Background and Significance of the Present Study

Interest in human curiosity has increased during the last decade because of the recognition of its relationship to creativity and problem solving. Current literature abounds in articles dealing with the value of curiosity. Curiosity and how it may be fostered is a common topic of concern when educators convene. Nevertheless, the emphasis in the schools is on teaching knowledge only rather than on helping children develop curiosity.

It would seem that since much learning is acquired through reading, a major emphasis upon the child's moves to be curious should be during his classes in reading instruction. The teacher should strive for some transfer to reading in the content areas and in recreational reading. All too often the questioning patterns used by teachers while they are directing reading require students only to remember, and practically no teachers fully utilize the full range of questions that require students to use ideas.

Of even more significance, the encouragement of students to raise questions is largely neglected in our schools, because the student's role is seen as that of answering questions. The result of such conventional
school practice can only be that intellectual curiosity is never truly encouraged in the schools or that it never blossoms. Edgar Dale has so aptly described the answer-oriented world.

Schools do not usually teach the art of questioning, but expect students to develop skill in answering questions that they didn't ask. We need to help students to ask better questions—more profound, more provocative, more worthy of study (5, p. 1).

This study was based upon recommendations for future studies made by Maw and Maw as a result of their numerous research findings pertinent to curiosity. The theory building of Berlyne relevant to curiosity strongly influenced the direction of the present study.

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 (12, p. 102). They quote writers who attribute the lack of curiosity in older children to the lack of stimulation in their environments, especially in the schools. The schools have succumbed, they felt, to teaching knowledge, which is easier than helping children develop curiosity. To do the latter, the Maws maintained that children must have experiences in the schools that will help stimulate the questioning attitude (12, p. 104). They 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 (12, p. 120).

On the basis of a study of children's curiosity as an aspect of reading comprehension, Maw and Maw hypothesized that children of high curiosity comprehend the meanings of sentences better than do children with low curiosity. A test using sentences yielded statistically significant differences between the means of the higher- and lower-curiosity
groups, favoring the higher curiosity groups (11, pp. 236-240). A relationship between curiosity and reading comprehension was inferred from this study.

In a study of the personal and social variables differentiating children with high and low curiosity, Maw and Maw found that high-curiosity children ask more and better questions than do low-curiosity children. High-curiosity children also have more general information about the world in which they live and can recall more specific facts of an unusual nature (13, p. 144).

An important aspect of Berlyne's theory of human curiosity was his differentiation of epistemic curiosity from perceptual curiosity. He defined epistemic curiosity as having knowledge as its main fruits and as being a drive which is reducible by knowledge rehearsal. Perceptual curiosity was distinguished by the fact that it leads to increased perceptual stimuli (3, p. 180). According to Berlyne, all specific epistemic behavior must be aroused in a subject by the equivalent of a question put to him whether by himself or by an external agent (1, p. 289). In an experimental study of epistemic curiosity where prequestioning and a post-questionnaire were employed, findings led him to conclude that prequestioning heightens epistemic curiosity. Heightened epistemic curiosity seemed to facilitate the retention of facts that enabled the subjects to answer the questions when they were subsequently presented to them (1, pp. 296-299).

The purpose of the research reported in this dissertation was to implement some of the knowledge about the curiosity of elementary school children in the school setting. It was an outgrowth of the pioneering
research in the study of the curiosity of children conducted by Maw and Maw and utilized Berlyne's theory of human curiosity.

General Statement of the Problem

The major purpose of the research was to determine whether the curiosity levels of children would be increased and whether gains would be made in children's reading comprehension when selected questioning procedures were used. The study was confined to teacher-directed instructional situations where children 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 increase in curiosity 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?

Statement of the Hypotheses

The present study tested the hypothesis that the use of questioning procedures will increase the curiosity levels of children and facilitate gains in children's reading comprehension. Specifically, the following hypotheses were tested:

1. There will be no significant difference between the increase in curiosity of Group I, Experimental, and Group II, Control.

2. There will be no significant difference between the increase in curiosity of Group II, Experimental, and Group I, Control.

3. There will be no significant difference between the increase in curiosity of Group I, Experimental, and Group II, Experimental.
4. There will be no significant difference between the increase in curiosity of Group II, Control, and Group I, Control.

5. There will be no significant difference between the increase in curiosity of Group I, Experimental, and Group I, Control.

6. There will be no significant difference between the increase in curiosity of Group II, Experimental, and Group II, Control.

7. There will be no significant difference in the gain in reading comprehension made by Group I, Experimental, and Group II, Control.

8. There will be no significant difference in the gain in reading comprehension made by Group II, Experimental, and Group I, Control.

9. There will be no significant difference in the gain in reading comprehension made by Group I, Experimental, and Group II, Experimental.

10. There will be no significant difference in the gain in reading comprehension made by Group I, Control, and Group II, Control.

11. There will be no significant difference in the gain in reading comprehension made by Group I, Experimental, and Group I, Control.

12. There will be no significant difference in the gain in reading comprehension made by Group II, Experimental, and Group II, Control.

Definition of Terms

The following terms are defined as they are used in the study. These terms are discussed in more detail in the section following the definitions.

**Interest:** Interest is an attitude, concern, or preference displayed when choices are available (10, p. 295).

**Motivation:** Motivation is the spur that activates, intensifies, and directs behavior.
Creativity: Creativity may be a successful step into the unknown; getting away from the obvious, the tested and the safe; being open to experience and permitting one thing to lead to another; recombining ideas or seeing new relationships among ideas (17, p. 189).

Curiosity: Curiosity is intrinsic motivation which results from strong needs or goals, a deep desire to find something out. It is a motive which directs, channels, and sustains purposive problem-solving behavior.

Reading comprehension: Reading comprehension involves not only understanding and interpreting what one reads but also responding to it.

Question: A Question is "any intellectual exercise calling for a response; this would include both problems and projects" (15, p. 2).

Discussion of Terms Used in the Study

Such words as creativity, motivation, discovery, interest, and problem-solving are often used in discussions of curiosity, and they are sometimes related very closely in meaning or treated as synonymous with curiosity. Since there is some variation in definitions of these words and the meanings ascribed to them, it was necessary to define them more precisely.

Maw and Maw differentiated interest and curiosity.

Curiosity may be thought of as the growing edge 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. Interest 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 ceases 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 (13, p. 30).

A motive, according to Frymier, is generally "... that which gives both direction and intensity to human behavior" (8, p. 37). Motivation energizes, activates, moves, or directs behavior toward goals. "A motive results in and hence can be inferred from purposive, means-end behavior ..." (4, p. 240).

There is little doubt that problem-solving situations have considerable attraction for man. Such intrinsic motivation may be evidenced by the concern which lower animals as well as human beings have for puzzles, problems, and other mental or physical exercises (4, p. 249).

Terman prefers to define creativity in terms of "... the process of sensing problems or gaps in information, forming ideas or hypotheses, testing hypotheses and communicating the results" (17, p. 188).

It is not difficult to relate motivation, problem-solving, and creativity. Motivation is the spur that directs behavior. Behavior may be channeled into problem-solving situations, because man is attracted to problems and puzzles. In the process of engaging in the problem-solving behavior, man may be creative. Terman continues defining creativity by stating that "such concepts as curiosity, imagination, discovery, innovation, and invention are also prominent in discussion of creativity and sometimes one or the other is equated with creativity" (17, p. 189).

Guilford has identified two basic cognitive modes, one of which can be considered to be creativity. These two processes are "convergent thinking" where the mode is toward retaining the known, learning the
predetermined, and conserving what is and "divergent thinking" which
tends toward revising the known, exploring the unknown, and developing
what might be (9, p. 14). The creative process is reflected in divergent
tinking where the focus is on intellectual discovery and innovation in
what is yet to be discovered.

One unabridged dictionary defines curiosity as "... the desire
to learn or know anything; inquisitiveness" (16). Another similarly
defines curiosity as "... a desire to learn or know" (7).

A more thorough definition is given as "... Disposition to inquire
into anything... Interest in experience, collection, or special inquiry..." (14).

The Dictionary of Education defines curiosity as "... a tendency
to wonder, to inquire, or to investigate, frequently expressed in
exploratory or manipulative activities; believed by some to be in part
congenital" (10).

Curiosity is even more succinctly defined by English and English in
A Comprehensive Dictionary of Psychological and Psychoanalytical Terms as
"... the tendency to investigate, to seek to observe the novel, to ob-
tain information" (6).

In developing a theory to deal with exploratory behavior in response
to novelty, Berlyne postulates, "When a novel stimulus affects an orga-
nism's receptors, there will occur a drive-stimulus-producing response
(R→S) (which we shall call 'curiosity')" (2, p. 79).

Curiosity is an intrinsic motive which results from an individual's
concern for learning more and more (4, p. 249). 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.

Possibly the aforementioned definition of curiosity is further clarified when the reader's attention is directed to what it is not. Curiosity is not exhibited every time some one seeks to find out something. If that be true, then when one is found asking a question, or engaging in exploratory behavior, he would not necessarily be engaging in a curious act. For example, "What kinds of questions are you going to have on the examination?" is possibly a sample of a low level of curiosity, but most likely it is not an expression coming from the existence of strong needs or goals which are thought of as "cues" to a high level of motivation and drive to find out something. Normally, when one wants to find out something, he is able to supply some criteria for judging what would or would not satisfy his inquiry. If this be so, the question above did not proceed from a deep desire to find out something—to satisfy a deep-rooted feeling; he merely wanted to have social exchange or to find out what types of questions might appear on the examination. Questions of this sort are seldom genuine requests for information; only rarely do they lend themselves to cognitive development.

In order to investigate curiosity as it exists in the classroom, it was necessary to define it behaviorally as it is exhibited by the learner. Maw and Maw have 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 (11, p. 236).

Results of an earlier study indicated that high-curiosity children as compared to low-curiosity children are those who

1. ask more and better questions,
2. select more outgoing, adventurous, investigatory activities,
3. have more general information about the world in which they live,
4. can recall more specific facts of an unusual nature,
5. react more positively to the unbalanced and unfamiliar,
6. persist longer at problem solving, and
7. are more alert to verbal absurdities (13, p. 14).

In the classroom setting, when the child is relieved of the pressures that are generally pressed upon him by the teacher (that is, strong needs, drives, and goal-directed activities are pressed on him by the teacher), for the purposes of the research study he was said to be curious when his attention was attracted by something about which he himself wished to find out something. The teacher's encouragement and guidance was of such a nature that when curious behavior was observed through overt actions of the child, he moved the student in the direction of more disciplined inquiry, further knowledge, and greater skill.

For the purpose of this research, the curious child was defined as one who

Expresses an intrinsically motivated desire to know more and more about himself and/or his environment. This strong desire to find something out finds expression in varied overt behavior. He may exhibit a puzzled expression when confronted with novel or dissonant stimuli in the environment and persist in observing and manipulating them or asking questions, listening, and reading in order to satisfy his quest to know.

Reading comprehension, as defined in this study, was more than understanding and interpreting word symbols.
Reading comprehension involves not only deriving meaning from what one reads but also responding to what one reads (e.g., thinking about what one has read, drawing inferences, relating).

Questioning as it was used in this study was more than merely posing interrogatives. Sanders' definition of the word "question" was employed. The term "question" was used to refer to "any intellectual exercise calling for a response. . ." (15, p. 2).

Organization of Succeeding Chapters

Chapter II will review the research in curiosity, reading comprehension, and questioning relevant to the study. The procedures used for collection and treatment of data will be described in Chapter III. The findings of this research relevant to each hypothesis and other findings will be reported in Chapter IV. A discussion of selected observations will be presented in Chapter V. Chapter VI will be devoted to a summary of the findings, conclusions, implications, and recommendations for further study.
Chapter Bibliography


CHAPTER II

REVIEW OF RELATED RESEARCH

A general statement of the problem researched was presented in Chapter I. In discussing the background and significance of the study, a few studies and selections pertaining to such areas as curiosity, questioning, and reading instruction were reviewed. This chapter will be devoted to elaborating on studies mentioned in Chapter I and other literature specifically related to this research.

Literature Pertaining to Curiosity

Pioneering Research of the Maws

Much of the pioneering research in the study of curiosity of children has been conducted by Maw and Maw. They have developed, validated, and refined paper-and-pencil tests for measuring curiosity of the elementary school child through the course of several studies. These instruments measure curiosity in school children with "a reasonable degree of accuracy," but they do not identify with a high degree of accuracy curiosity in any given child (14, p. 117). These measuring instruments will be described in Chapter III.

Reference was made in Chapter I to Maw and Maw's study, from which they inferred a relationship between curiosity and reading comprehension (15, pp. 236-240). In an investigation designed to determine the personal
and social variables differentiating children with high and low curiosity, the Nows found these common characteristics in the children studied with high curiosity.

1. Have a higher level of self-acceptance than low-curiosity children

2. Are more self-sufficient than low-curiosity children

3. Tend to feel more secure than low-curiosity children

4. Are more free from hindering anxieties and self-doubts than are low-curiosity children

5. Are more organized in their thought processes than are low-curiosity children; are more creative and flexible and more consistent in their thought processes than are low-curiosity children

6. Are more tolerant of ambiguity than are low-curiosity children

7. Hold a more balanced point of view in relation to moral values than do low-curiosity children

8. Have reached a higher level of emotional maturity than have low-curiosity children

9. Are more free from social prejudice than are low-curiosity children

10. Exhibit a healthier participation in group activities than do low-curiosity children

11. Show a higher level of social skill than do low-curiosity children

12. Are more responsible for group welfare than are low-curiosity children

13. Show better overall social adjustment than do low-curiosity children

14. Feel that their discipline is more fair than do low-curiosity children

15. Are better in their overall adjustment than are low-curiosity children

16. Have parents who are more accepting of their behavior than are parents of low-curiosity children
17. Are more likely to have parents who reward and encourage information seeking and exploratory behavior than are low-curiosity children

18. Have parents who are more democratic in their child-rearing practices than are the parents of low-curiosity children (16, pp. 154-157)

In a more recent study, Wallace H. Maw sought to identify a limited number of factors on which to base a definition useful in distinguishing between children differing in their levels of curiosity (13, p. 3). On the basis of this study Maw described high-curiosity boys as self-actualized, creative, emotionally mature, capable of abstract thinking and considerable leadership, while being persistent and desirous of having ideal or moral qualities. He stated that the data obtained for girls were not as complete, but that high-curiosity girls show considerable leadership, often reject cultural demands, sometimes feel insecure, and are frequently prejudiced. They tend to be well adjusted in most situations and are quite shrewd, showing a high level of self-control and a desire for companionship. These girls are persistent and are able to conceptualize abstractly (13, pp. 63-64).

The Maws used teacher-, peer-, and self-appraisal of curiosity in order to establish criterion groups to be used in instruments designed to measure curiosity (17, p. 31). In a recent study they proposed to determine whether a self-rating inventory of curiosity could be used to determine groups of children differing in curiosity as effectively as combined teacher and peer ratings. The self-appraisal inventory proved to be useful in identifying groups of children differing in curiosity levels (17, pp. 462-465).
The Maws have made inestimable contributions to the research in curiosity of children. Their studies have been limited to fifth-grade children. They have developed tests for measuring the curiosity of the elementary school child and have studied the personal and social variables and factors which differentiate children with high curiosity from those who are characteristically low in curiosity.

Berlyne's Theory of Human Curiosity

In developing a theory of human curiosity, Berlyne differentiated between epistemic and perceptual curiosity. He maintained that perceptual curiosity, found in lower animals as well as in human beings, leads to increased perception of stimuli. Epistemic curiosity was described as having knowledge as its main fruit and as being a drive which is reducible by knowledge rehearsal (3, p. 180).

Conceptual conflict is defined by Berlyne as incompatible symbolic response patterns such as beliefs, attitudes, thoughts, and ideas. Berlyne hypothesized that conceptual conflict is the principal factor producing epistemic curiosity (2, p. 255). He described the major types of conceptual conflict. Doubt is presented as a conflict between tendencies to ascribe and to deny reality to a phenomenon. Perplexity occurs, he believed, when there are factors inclining the subject toward each of a set of mutually exclusive beliefs. A subject is under the influence of contradiction when he is committed to propositions implying that a particular proposition is and is not true. Conceptual incongruity occurs when a subject believes that two properties never occur together, or are unlikely to occur together, and yet factors are present that lead him to believe
that a certain object possesses both. The condition of confusion is produced by information whose implications are not clear. Irrelevance occurs when thoughts that appear unlikely to carry the subject nearer to a solution obtrude themselves (2, p. 258).

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

1. Questions heighten epistemic curiosity, facilitating the retention of facts that answer the questions 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 more desirous of knowing the answers to questions which surprised them (1, pp. 296-299).

A study was designed by Mittman and Terrell to test Berlyne's epistemic curiosity formulation in children. Subjects in the study were first- and second-graders differentiated with respect to level of epistemic curiosity and required to learn size and form tasks concurrently. The subjects of the high-curiosity group performed in a manner superior to those of the moderate- or low-curiosity groups. The investigators interpreted the results in terms of Berlyne's formulation of conflict arousal (the arousal of conflicting response tendencies) as playing a central role in determining the strength of curiosity. Increased conflict and a 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" (18, pp. 851-855).
Curiosity as an Aspect of Cognitive Growth

In writing of the "push" propelling growth or the complex "will to learn," Bruner recognized 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 (7, p. 4).

In Maslow's theory of motivation and personality he postulated that man is characterized by impulses to satisfy curiosity, to know, to explain, and to understand. The cognitive needs for acquiring knowledge and systemizing the universe are considered as, in part, techniques for the achievement of basic safety in the world, or for the intelligent man, expressions of self-actualization (12, p. 94).

Maslow described the cognitive impulse as so strong that the history of mankind is filled with "instances in which man looked for facts and created explanations in the face of the greatest danger" (12, p. 94). A defining characteristic of psychologically healthy people is that they are attracted to the mysterious, to the unknown, to the chaotic, unorganized, and unexplained (12, p. 94).

Maslow maintained that these cognitive needs are seen perhaps even more strongly in infancy and early childhood than in adulthood. 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 . . . " (12, p. 96).
In How Children Learn, John Holt maintained that adults 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, Holt stated, they could 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 (11, p. 8).

Holt felt that school must be a place where children can grow in curiosity. He described the need for a better understanding of the "... ways, conditions, and spirit in which children do their best learning." When this need is realized he saw school becoming "... a place in which all children grow, not just in size nor even in knowledge, but in curiosity, courage, confidence, independence, resourcefulness, resilience, patience, competence, and understanding" (11, p. viii).

We are giving no special consideration in the schools "to providing a reading program that permeates the power of their [children's] curious minds," Bradley contended. He described the child for the first few years as "mentally alert, interested, curious, and striving to learn." Nevertheless, "spirit for being curious" is gradually lessened as he progresses through the secondary years (5, p. 448). The author 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. Bradley further challenged teachers by stating that
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 curious through imitation. If they are to become more imaginative, creative and curious about thinking, the teacher's role must be one of inventor, provider, and improviser (5, pp. 541-542).

**Literature Related to Questioning As An Instructional Procedure**

**Encouraging Student-Initiated Questions**

Berlyne noted that a pattern including both cue stimuli and motivational or drive-inducing stimuli are 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 (1, p. 289). Curiosity is aroused in a subject by strange, surprising, or puzzling questions put to him whether by himself or by an external agent (3, pp. 184, 189).

Shumsky maintained that the ability to raise questions is as important as the ability to find the answers. Yet, when the number of questions raised by children in a typical lesson is counted, it is obvious that children are not being encouraged to raise questions (21, pp. 172, 190).

In a random sampling of forty primary-grade teachers, selected by their principals as the best, Floyd found 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, that they chiefly employed memory questions.
He found these teachers to be unskilled in the use of questioning in the instructional setting and seemingly unaware that such a skill could be developed (9, pp. 53+).

The simple process of asking questions and then seeking answers to them was described by Shelton as having a great deal of learning, growth, and progress revolving around it. He arranged five steps in the process into a kind of natural sequence or cycle. He saw one turn of the spiral as curiosity, courage, and thinking—the question-asking part of the process. The other half of the spiral—thinking, tools, and knowledge—was more concerned with answer seeking, he felt. Shelton observed that the answer-seeking half of the spiral tends to get most of the attention in too many classrooms. A major reason for this, he felt, is because this half is easier to "teach." It is a challenge to teach thinking, fostering courage amounts to encouraging a youngster to question authority, and curiosity is neglected because it is easier to recognize than to stimulate (20, pp. 73-76).

Classifying Questions

Bloom et al. developed a taxonomy of behaviors in the cognitive domain, arranged from the simple to the complex. This classification scheme was made primarily from an educational viewpoint, utilizing the distinctions which teachers make in the development of curriculum and teaching procedures. The taxonomy has proved to be a useful tool for classifying educational behaviors. The mental processes in the cognitive hierarchy are knowledge (memory), translation, interpretation, application, analysis, synthesis, and evaluation (4, pp. 18-19).
The basic ideas underlying Sanders' study of classroom questions came from the handbook, *Taxonomy of Educational Objectives*, Benjamin S. Bloom, editor. Sanders used the categories of thinking in the taxonomy and contended that students can be led to think in each category through the use of the taxonomy of questions presented in his book, *Classroom Questions—What Kinds?* The basic hypotheses upon which Sanders built his book are that teachers can lead students into all kinds of thinking through careful use of questions, far too many teachers overemphasize those questions that require students only to remember, and practically no teachers make full use of all worthwhile kinds of questions. Sanders recommended that classroom questions be systematically considered that require students to use ideas rather than simply to remember them (19, pp. 1-2).

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 (6, pp. 65, 69-71).

**Literature Related to Reading Comprehension**

In a report on the nature of reading comprehension, Cleland stated that reading and comprehension cannot be separated. He presented a definition of reading, or the complex intellectual process of comprehension, that appealed to him.

... The mental act of comprehending (or reading) may be thought of as a gestalt. Because of the configuration of main and supporting ideas, a meaning emerges (8, p. 20).
Cleland summarized the intellectual processes that are employed as the reader or listener acquires an insight, "a gestalt of the meanings that are portrayed by the language of the author or the speaker," through a construct or model. The processes presented and explained as initially employed in comprehension were perception, apperception, abstraction, and appraisal. The gleanings secured as a result of these steps are used by the reader, Cleland stated, as the materials of reasoning in the following modes of thinking: (1) inductive reasoning, (2) deductive reasoning, (3) critical thinking or reasoning, (4) problem solving, and (5) creative thinking. The final step in the intellectual processes employed as a reader or listener gains meaning was given by Cleland as application. He considered the functional uses readers make of the new ideas acquired to be the determiner of the effectiveness of a reading program (8, pp. 28-31).

Guszak studied the interaction between teachers and students in the reading circle as they engaged in the development of reading-thinking skills. He developed a model called the "Reading Comprehension Question-Response Inventory" from an extensive survey of reading-thinking skills as identified in basal series, reading-thinking skills as identified by reading authors, and representative thinking models. Questions were classified as recognition, recall, translation, conjecture, explanation, and evaluation. In Guszak's study most used questions were recall, evaluation, and recognition. Translation and conjecture questions were seldom employed (10, pp. 227-229).

In a study of children's curiosity as an aspect of reading comprehension, Maw and Maw hypothesized that children of high curiosity comprehend
the meaning of sentences better than do children with low curiosity. A test was developed using sentences. Some were common absurdities and others were straight-forward statements. The differences between the means of the higher- and lower-curiosity groups were statistically significant, favoring the higher-curiosity groups (15, pp. 236-240). On the basis of this study, there seems to be a relationship between curiosity and reading comprehension.

Summary

Curiosity is an important aspect of cognitive growth. Children who are curious learn more efficiently because curiosity is a spur to learning. The priority in education today should be to foster children's curiosity.

Questioning arouses curiosity. The learner's curiosity is stimulated more when he asks the questions and seeks answers to these questions. Children should be encouraged to raise questions. Teachers can lead students into all kinds of thinking through careful use of questions. Questions that require students to use ideas rather than simply to remember them should be frequently employed in instructional situations.

When the intellectual processes are employed that enable the reader to comprehend the language of the writer, the final step in the reading process is application of the ideas acquired. In oral response to a written selection, students should be encouraged to raise questions and reading-thinking skills should be developed through the use of translation and conjecture questions. On the basis of a study conducted by Maw and Maw, there seems to be a relationship between curiosity and reading comprehension.
A review of the research in curiosity, questioning, and reading comprehension relevant to this study was presented in the present chapter. In Chapter III the procedures used for the collection and treatment of data will be described.
Chapter Bibliography


CHAPTER III

PROCEDURES FOR COLLECTION AND TREATMENT OF DATA

In Chapter I a general statement of the problem researched was presented. Chapter II was devoted to reviewing the literature specifically related to the study. In Chapter III the procedures used in the collection and treatment of data will be described.

Description of the Sample

The school district in which the study was conducted serves a suburban population in a large metropolitan area. The children comprising Group I came from a neighborhood of housing developments. Many homes in this neighborhood are large, brick, well-kept structures. The elementary school serving this attendance area is about ten years old.

The attendance area from which Group II came is one of diversity. Most homes in this area are more than ten years old and range from small, modest, frame structures to large, luxurious brick houses. The elementary school serving this neighborhood is about twenty years old.

Both Group I and Group II are fairly stable groups in length of attendance in their schools. In Group I, 60.4 percent of the students had attended their school during their entire school career. Of the students in Group II, 70.2 percent had attended their school since entering first grade.
There were 171 elementary school children participating in the study. Of this total number, 89 comprised Group I, and there were 82 subjects in Group II.

Parents of both Group I and Group II subjects were engaged in a variety of occupations. Vocations such as engineer, lawyer, dentist, minister, and teacher can be considered as professional if professional vocation is defined as requiring a minimum of the equivalent of a four-year college education. Considering both mothers and fathers, a total of 17.3 percent of parents in Group I were unquestionably engaged in professional vocations. Only 4.7 percent of Group II's parents were definitely employed in professional occupations.

The California Test of Mental Maturity, Short Form, was administered to both Group I and Group II subjects in the previous school year. The mean IQ for Group I was 120.3, while Group II's mean IQ was 112.4.

### TABLE I

A DESCRIPTION OF THE TEACHERS PARTICIPATING IN THE STUDY

<table>
<thead>
<tr>
<th>Teacher</th>
<th>Present Age</th>
<th>Years of College</th>
<th>Hrs. Above Degree</th>
<th>Years of Experience</th>
<th>Grade Levels Taught</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I-A</td>
<td>58</td>
<td>4</td>
<td>0</td>
<td>21</td>
<td>1-2-3-4-5-6-7</td>
</tr>
<tr>
<td>Group I-B</td>
<td>51</td>
<td>4</td>
<td>9</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Group I-C</td>
<td>29</td>
<td>5</td>
<td>0</td>
<td>7</td>
<td>4-5</td>
</tr>
<tr>
<td>Group II-A</td>
<td>67</td>
<td>5</td>
<td>3</td>
<td>36</td>
<td>5</td>
</tr>
<tr>
<td>Group II-B</td>
<td>53</td>
<td>5</td>
<td>11</td>
<td>29</td>
<td>1-3-4-5-6</td>
</tr>
<tr>
<td>Group II-C</td>
<td>29</td>
<td>5</td>
<td>15</td>
<td>6</td>
<td>5</td>
</tr>
</tbody>
</table>
Group I teachers were slightly younger than Group II teachers and had taught generally for fewer years. Three teachers, two in Group II and one in Group I, had taught in school districts other than in the school district studied. All Group II teachers and one Group I teacher had masters degrees. Half of the teachers had taught only at grade five. More detailed information regarding the six teachers who participated in the study is presented in Table I.

Description of the Measures Employed

Paper-and-pencil tests for measuring the curiosity of elementary school children, developed by Maw and Maw, were employed in the study. The authors have validated and refined these measuring instruments through the course of three studies (6).

To validate the instruments designed to measure curiosity, Maw and Maw established two criterion groups—one high in curiosity, the other low. In the major study, a number of tests used in the two preliminary studies were shortened and combined into Battery A and Battery B so that each battery could be administered in forty-five minutes. Two other tests, the Zoo and the Which-to-Discuss Test, were administered separately (6, pp. 97, 105). Copies of Battery A and Battery B are included as Appendices A and B.

Table II lists the names of the various tests used by Maw and Maw in their major study. In parentheses is given some identification such as what the test is thought to measure or what the test requires. Reliability coefficients for the tests are presented.
Both Battery A and Battery B discriminated between upper and lower portions of the curiosity group at a significant level. The standard scores derived from the sum of ranks based on criterion groups were correlated with the total scores for Batteries A and B. The correlation coefficients were .30 for Battery A and .32 for Battery B. The children of the higher-curiosity groups had significantly higher averages on both Battery A and Battery B than did the children of the lower-curiosity groups (6, pp. 95-98).

### TABLE II

<table>
<thead>
<tr>
<th>Kind of Test</th>
<th>Reliability Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>What Would You Do (Preferred behavior)</td>
<td>.77</td>
</tr>
<tr>
<td>Which Saying Do You Believe (Conservatism; Caution)</td>
<td>.46</td>
</tr>
<tr>
<td>What Do You Know (Breadth of information)</td>
<td>.67</td>
</tr>
<tr>
<td>Foolish Sayings (Attention; Detection of absurdities)</td>
<td>.58</td>
</tr>
<tr>
<td>Musical Instrument (Questions about a picture)</td>
<td>.66</td>
</tr>
<tr>
<td>Train (Questions about a story)</td>
<td>.75</td>
</tr>
<tr>
<td>Path Puzzles (Persistence; Desire to know)</td>
<td>.35</td>
</tr>
<tr>
<td>Hidden Pictures (Persistence; Attention)</td>
<td>.70</td>
</tr>
<tr>
<td>Code (Persistence; Desire to know; Attention)</td>
<td>.49</td>
</tr>
<tr>
<td>Which to Discuss (Preference for unbalanced and/or unfamiliar)</td>
<td>.91</td>
</tr>
<tr>
<td>Zoo Questions (Memory for unusual information)</td>
<td>.81</td>
</tr>
</tbody>
</table>

(6, p. 97)

Battery C was developed from items left out of Batteries A and B when it became necessary for Maw and Maw to combine and shorten them so that each battery could be administered in forty-five minutes. (See
Appendix C.) Equivalent Memory-for-Story and Questions and Which-to-Discuss Tests were constructed to accompany Batteries B and C.

The "Reading Comprehension Test" of the Iowa Tests of Basic Skills was used to determine the extent to which a student could read with comprehension. Reliability coefficients for the major tests of the Iowa Tests of Basic Skills range from .84 to .96 (3, p. 33). Test validation is based on "... all the commonly used principles' of test validation of test content, curricular and statistical" (3, p. 36).

Nine reading selections are included in the "Reading Comprehension Test" for fifth grade and there are seventy-four exercises. "The test of reading comprehension is designed to evaluate the specific comprehension skills involved in grasping details and purpose, analyzing organization, and evaluating a reading selection" (3, p. 16).

Research Design and Procedures

Research Design

The rotation-group design was used, because it seemed most appropriate to meet the needs of this study. When this design is used, the researcher applies some independent variables to different groups at different times (8, p. 237). In this study the technique was applied in two cycles.

Cycle I:  Group I – Experimental Method
          Group II – Control Method
Cycle II: Group I – Control Method
          Group II – Experimental Method (1, p. 135)

The use of the rotation-group design rotates out some nonexperimental factors that influence the dependent variable. Examples of such factors are (1) materials unequal in difficulty used with methods that are being
compared, (2) maturity of subjects, (3) teacher variability, and (4) carry-over learning. According to Van Dalen, "Since all independent variables are exposed to the same influences during the conduct of the experiment, the effects on the dependent variable tend to be minimized" (8, p. 238).

Best contends that when the rotation-group design is used, if a particular teaching method consistently produces superior gain, no matter in what order or to which group it is applied, its superiority would be confirmed with much greater confidence. Best states that "this technique would tend to minimize the influence of uncontrolled factors and to provide a more convincing test of the superiority of the particular method under investigation" (1, p. 135). The present study might be diagrammatically presented as below.

**TABLE III**

**DIAGRAM OF RESEARCH DESIGN**

<table>
<thead>
<tr>
<th>Weeks</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>T1*</td>
<td>OE</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td>E</td>
<td></td>
</tr>
<tr>
<td>Group II</td>
<td>T1</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
<td>C</td>
</tr>
</tbody>
</table>

*The meanings of the symbols in Table III are as follows:
T - Test; O - Orientation; E - Experimental Method; C - Control Method.

Test 1 consisted of Battery A, "The You Test," a test of curiosity and Form 4 of the "Reading Comprehension Test" of the Iowa Tests of Basic Skills. Test 2 was composed of Battery B, "The You Test," a test of curiosity and Form 3 of the "Reading Comprehension Test" of the Iowa Tests of
Basic Skills. Included in Test 3 were Battery C, "The You Test," a test of curiosity and Form 2 of the "Reading Comprehension Test" of the Iowa Tests of Basic Skills. This is summarized in Table IV, below.

TABLE IV

<table>
<thead>
<tr>
<th>Tests</th>
<th>Iowa Tests of Basic Skills</th>
<th>The You Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test 1</td>
<td>Form 4</td>
<td>Battery A</td>
</tr>
<tr>
<td>Test 2</td>
<td>Form 3</td>
<td>Battery B</td>
</tr>
<tr>
<td>Test 3</td>
<td>Form 2</td>
<td>Battery C</td>
</tr>
</tbody>
</table>

Selection of Subjects and Assignment to Groups

The school district where the study was conducted was selected because it had self-contained fifth-grade classrooms. This type of administrative organization gives one teacher more control over instructional situations.

The two elementary schools that participated in the study each contained at least three fifth-grade class sections and were not overburdened with involvement in research projects. In one of the participating schools, three of the four sections of fifth grade were chosen randomly to take part in this study. Six of the seven fifth-grade class sections in these two schools participated intact in this research study.
Subjects were divided into two groups. Each group was composed of three sections of fifth 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.

Validation of Questions

Sets of questions like those that were used in the study were developed and based upon the types of reading material to be used in the study. These questions were patterned after four categories of questions designed by Bradley and Earp to develop children's cognitive powers (2, pp. 70-71). A "Question Rating Scale" was constructed to rate the extent to which questions would encourage, satisfy, or extend a student's moves to be curious. (See Appendix D.)

Ten selections were written and each selection was followed by four questions. One question was given on each of four categories of questions developed by Bradley and Earp. These selections and questions covering each selection were randomly assigned their relative positions in the "Question Rating Scale."

A jury of twelve members was initially selected to rate the sets of questions like those used in the study. Two of the jury members were found to be in special engagements which would preclude their responding to the "Question Rating Scale" without an elongation of the study. It therefore seemed appropriate to contact four other prospective jurors.

The jury which rated the questions like those used in the study was made up of professional people who deal with elementary school children. (See Appendix E.) Of those jurors contacted, twelve are serving at the
college level and four are at the public school level. Table V presents these breakdowns in the level where those contacted serve and indicates that a total of thirteen jurors, or 81.25 percent, responded and served to rate the questions.

<table>
<thead>
<tr>
<th>Level of Service</th>
<th>Number Contacted</th>
<th>Number Responding</th>
</tr>
</thead>
<tbody>
<tr>
<td>College</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Public School</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>13</td>
</tr>
</tbody>
</table>

Nine of the jurors were from the state where the study was conducted and four were serving in another state. Five points on a continuum were used in the rating scale. The rationale behind this number of units is that if fewer steps were used, the scale would be so coarse as to have little meaning. "If a larger number of units were used, the discriminations among them would become increasingly more difficult and the scale would tend to become less reliable" (7, p. 203). If a trait is to be analyzed into three categories, a five-point scale is desirable to use, since judges hesitate to give extreme ratings and tend to give judgments in the middle category (7, pp. 203-204). Specific descriptions were given to identify the points along the scale. Such descriptions lead to
the development of dimensions that are clearer and more likely to be unidimensional (5, p. 197).

The responses of the jury were analyzed to determine the types of questions rated as most likely to encourage curiosity. The types of questions which received an average rating of 3.5 or higher from the jury were considered to be most effective in encouraging, satisfying, or extending a student's moves to be curious.

The mean rating for type one questions was 2.6. The mean rating was 2.8 for type two questions. Type three questions had a mean rating of 3.5 and the mean rating for type four questions was 3.7. Type three and type four questions met the criterion set for determining questions which would stimulate curiosity.

A standard deviation of ratings was computed for each question to determine agreement among raters. The mean of the standard deviation of ratings was 1.25 for type one questions, 1.11 for type two questions, 1.02 for type three questions, and .98 for type four questions. There was more rater-agreement on type three and type four questions than there was on types one and two questions.

Orientation of Teachers

Two observational instruments were used by the experimenter in both the control and the experimental groups to determine the degree to which teachers were using questions that might enhance curiosity and increase reading comprehension and the proportion of teacher- and student-initiated questions being used prior to the study. The observational instruments used were "Analysis of Teacher- and Student-Initiated Questions" and the "Question Encouragement Appraisal." (See Appendices F and G.)
Teachers in both experimental groups were introduced to a guide entitled "Using Questions in Reading Instruction." (See Appendix H.) This orientation was done with each teacher individually. Each teacher was provided a copy of the guide, given a brief orientation to its use, and requested to read it and formulate questions about the guide for a subsequent conference. In the follow-up conference the teacher raised questions about anything in the guide which he did not understand. The guide was used as a basis for discussing general plans for the study and the time schedule. Each teacher received additional assistance as needed throughout his participation as a teacher of an experimental class section.

**Experimental Treatment**

The experimental group teachers utilized oral and written prequestioning of students before the reading of basal reader, content area, and recreational selections. Teachers also raised oral and written questions following the reading of selections. Questions to be used with basal selections and samples of other types of reading materials and appropriate questions are found in the guide, "Using Questions in Reading Instruction." (See Appendix H.) These questions were formulated using four categories of questions described by Bradley and Earp (7, pp. 70-71) to develop children's cognitive powers.

Experimental teachers were furnished guidelines in the guide, "Using Questions in Reading Instruction," for identifying the curious behavior of a child displayed in the act of reading. Whenever curious behavior was observed, the teacher asked the child a question.
Student-initiated questions were encouraged. Lessons were taught with the purpose of helping students develop questioning skills. Students were given ample opportunity to ask the questions raised through reading and enough time to explore these queries. Students were allowed to explore the topics which aroused their curiosity and had an opportunity to share their discoveries. Each student kept a record of his reading.

Two observational instruments were used in the experimental groups. The "Analysis of Teacher- and Student-Initiated Questions" determined the categories of questions employed by teachers and students and provided an indication of the proportion of teacher- and student-initiated questions. (See Appendix F.) The "Question Encouragement Appraisal" determined the methods being used to encourage student-initiated questions. (See Appendix G.)

The data from the observational instruments served as the basis for conferences with the teachers of experimental sections. The purpose of such conferences was to identify specific action to take to increase effectiveness in teacher and student use of questioning.

The control group teachers were given no special instructions but were told to use their regular classroom procedures. Questioning is a commonly employed teaching procedure, but all too often teachers are not skilled in the use of questions to stimulate inquiry and to promote cognitive development.

In the conventional classroom, there is far too much emphasis on factual, recall questions that require students only to remember. The teacher's role is seen as one who raises questions to which students must
respond. In this context, student-initiated questions are not encouraged. The student's impulse to investigate the world around him may not only be discouraged but actually may be thwarted.

Treatment of Data

Group II was given tests during the first, eighth, and fifteenth weeks while Group I tests were administered during the second, ninth, and sixteenth weeks, as described in the section, Research Design, pages 33 to 35. Tests 1 and 2 served as the pretest and posttest for Group I-E and Group II-C. Tests 2 and 3 provided pretest and posttest scores for Group I-C and II-E.

The two-tailed t-test was used to test the significance of each hypothesis. The t-test is used when samples are less than 500 and hypotheses about the population mean are tested. The two-tailed test of significance is used for the null hypothesis when any difference that is observed between the two means, regardless of the direction of the difference, is sought (4, pp. 247, 257). Tests used with each hypothesis are indicated in Table VI.

Limitations

Even though the rotation-group design tends to minimize the influences of uncontrolled factors, the procedures used for the selection of experimental schools and teachers must be acknowledged as a limitation.

E and C refer to Experimental and Control respectively.
of the study. It was not possible to match the experimental groups or the teachers participating in the study.

There have been few studies conducted which deal specifically with the curiosity of children. The general value of curiosity is recognized, but no procedures for helping children develop curiosity have been established. The present study was a pioneer effort to apply some of the knowledge obtained about curiosity in an elementary school instructional situation.
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.
Chapter Bibliography


A general statement of the problem researched was presented in Chapter I. In Chapter II, the literature specifically related to the study was reviewed. Chapter III was devoted to describing the procedures used in the collection and treatment of data. The primary purpose of Chapter IV was to report the findings of the study.

The present study tested the hypothesis that the use of questioning procedures will increase the curiosity levels of children and facilitate gains in children's reading comprehension. Twelve specific hypotheses were formulated and tested by the two-tailed $t$-test. The results of the $t$-tests were analyzed both individually and collectively. The .05 level of confidence was set for determining the significance of hypotheses. Computed $t$ falling within or beyond this level was rejected.

Findings Relevant to Hypotheses on Curiosity

**Mean Gains in Curiosity**

The mean gain in curiosity was computed for each group. The mean gain in curiosity for Group I-E was 18.8. Group I-C had a mean difference in curiosity of -27.7 between Test 2 and Test 3. A mean gain in curiosity of 10.0 was made by Group II-E, while the mean gain in curiosity for Group II-C was 4.5. Experimental groups made larger mean gains in
curiosity than did control groups. These data are presented in Table VII.

It is noteworthy that Group I-E made the largest mean gain in curiosity and that the same group, while serving as the control group,

TABLE VII

THE NUMBER IN EACH GROUP AND MEAN GAIN IN CURIOSITY

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Mean Gain in Curiosity</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-E</td>
<td>89</td>
<td>18.8</td>
</tr>
<tr>
<td>I-C</td>
<td>89</td>
<td>-27.7</td>
</tr>
<tr>
<td>II-E</td>
<td>82</td>
<td>10.0</td>
</tr>
<tr>
<td>II-C</td>
<td>82</td>
<td>4.5</td>
</tr>
</tbody>
</table>

actually regressed in level of curiosity (mean, -27.7). Since Group I was the experimental group for the first cycle of the experiment and then served as the control group for the second cycle, the intentional withdrawal of the experimental treatment from this group might have caused their regression in level of curiosity.

Tests of Significance

Table VIII gives computed $t$ for each hypothesis related to curiosity. Tabled $t$ at four levels of confidence is also presented.

Hypothesis 1 stated that there would be no significant difference between the increases in curiosity of Group I-E and Group II-C. This hypothesis was rejected, because computed $t$, 2.24, was significant
beyond the .05 level of confidence. This significant difference was in favor of the experimental group. The findings of this hypothesis give credence to the contention that the use of selected questioning procedures effectively enhances curiosity.

In Hypothesis 2 no significant difference between the increases in curiosity of Group II-E and Group I-C was predicted. Computed $t$ for Hypothesis 2 was 6.23 and was significant beyond the .01 level of confidence. Hypothesis 2 was therefore rejected. Group II, Experimental, made a significantly greater mean gain in curiosity than did Group I, Control. These results further substantiate the findings in Hypothesis 1.

**TABLE VIII**

DEGREES OF FREEDOM WITH COMPUTED $t$ FOR EACH HYPOTHESIS PERTAINING TO CURiosity 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>169</td>
<td>2.24</td>
<td>1.66</td>
<td>1.98</td>
<td>2.35</td>
<td>2.61</td>
</tr>
<tr>
<td>2</td>
<td>169</td>
<td>6.23</td>
<td>1.66</td>
<td>1.98</td>
<td>2.35</td>
<td>2.61</td>
</tr>
<tr>
<td>3</td>
<td>169</td>
<td>1.48</td>
<td>1.66</td>
<td>1.98</td>
<td>2.35</td>
<td>2.61</td>
</tr>
<tr>
<td>4</td>
<td>169</td>
<td>1.99</td>
<td>1.66</td>
<td>1.98</td>
<td>2.35</td>
<td>2.61</td>
</tr>
<tr>
<td>5</td>
<td>88</td>
<td>7.63</td>
<td>1.66</td>
<td>1.99</td>
<td>2.37</td>
<td>2.63</td>
</tr>
<tr>
<td>6</td>
<td>81</td>
<td>0.82</td>
<td>1.66</td>
<td>1.99</td>
<td>2.38</td>
<td>2.64</td>
</tr>
</tbody>
</table>
A prediction that there would be no significant difference between the increases in curiosity of Group I-E and Group II-E was made in Hypothesis 3. Since computed $t$ was 1.48, outside the .05 level of confidence, Hypothesis 3 could not be rejected. The difference between the increases in curiosity made by the two experimental groups was not significant. These findings indicate the consistency with which the experimental treatment effected similar gains in curiosity for two different groups of children.

Hypothesis 4 stated that there would be no significant difference between the increases in curiosity of Group I-C and Group II-C. This hypothesis was rejected because computed $t$, 4.99, was significant beyond the .01 level of confidence. There was a significant difference in the increases in curiosity made by the two control groups. Group II-C made the larger increase in curiosity.

No significant difference between the increases in curiosity of Group I-E and Group I-C was predicted by Hypothesis 5. Hypothesis 5 was rejected because computed $t$, 7.63, was significant beyond the .01 level of confidence. The increase in curiosity made by Group I-E was significantly larger than that made by Group I-C.

Hypothesis 6 stated that there would be no significant difference between the increases in curiosity of Group II-E and Group II-C. This hypothesis could not be rejected because computed $t$, 0.82, did not reach the .05 level of confidence. There was no significant difference between the mean gains in curiosity made by Group II-E and Group II-C. The experimental group did, however, make the larger increase in curiosity.
Perhaps the final effort that teachers make in the closing weeks of the school year to advance students academically could retard student growth in curiosity. This might account for Group II's lack of significant gain in curiosity as an experimental group over its gain as a control group.

Findings Relevant to Hypotheses on Reading Comprehension

Mean Gains in Reading Comprehension

The mean gain in reading comprehension was computed for each group. Table IX presents the data. Group I-E made a mean gain of 1.9 in reading comprehension. The mean gain in reading comprehension for Group I-C was 3.5. A mean gain in reading comprehension of 7.7 was made by Group II-E, while Group II-C regressed in reading comprehension (mean, -2.0).

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Mean Gain in Reading Comprehension*</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-E</td>
<td>89</td>
<td>1.9</td>
</tr>
<tr>
<td>I-C</td>
<td>89</td>
<td>3.5</td>
</tr>
<tr>
<td>II-E</td>
<td>82</td>
<td>7.7</td>
</tr>
<tr>
<td>II-C</td>
<td>83</td>
<td>-2.0</td>
</tr>
</tbody>
</table>

*The mean gain in reading comprehension is expressed in raw scores.
Group I, Control, made a larger mean gain in reading comprehension than did the same group while serving as the experimental group. In contrast, Group II-E's mean gain in reading comprehension surpassed that of Group II-C. Since Group I was the experimental group for the first cycle of the study, it might be conjectured that teacher effort toward academic advancement in the final weeks of the school year contributed to Group I-C's having a significantly larger increase in reading comprehension over the same group's gain as the experimental group. It is possible that the use of selected questioning procedures by Group I as an experimental group had some degree of carry over when they served as control group subjects. The experimental treatment was not purposefully used by their teachers during the control period.

Tests of Significance

Table X gives computed $t$ for each hypothesis relevant to reading comprehension. Tabled $t$ at four levels of confidence is also presented.

Hypothesis 7 stated that there would be no significant difference in the gains in reading comprehension made by Group I-E and Group II-C. This hypothesis was rejected, because computed $t$, 2.88, was significant beyond the .01 level of confidence. This significant difference was in favor of the experimental group. The use of selected questioning procedures seemed to promote growth in reading comprehension.

In Hypothesis 8 no significant difference between the mean gains in reading comprehension of Group II-E and Group I-C was predicted. Computed $t$ for Hypothesis 8 was 3.05 and was significant beyond the .01 level of confidence. Hypothesis 8 was therefore rejected. Group II,
serving as the experimental group, made a significantly larger increase in reading comprehension than did Group I, the control group. These findings lend support to the results for Hypothesis 7.

TABLE X

DEGREES OF FREEDOM WITH COMPUTED $t$ FOR EACH HYPOTHESIS PERTAINING TO READING COMPREHENSION 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>7</td>
<td>169</td>
<td>2.88</td>
<td>1.66</td>
<td>1.98</td>
<td>2.35</td>
<td>2.61</td>
</tr>
<tr>
<td>8</td>
<td>169</td>
<td>3.05</td>
<td>1.66</td>
<td>1.98</td>
<td>2.35</td>
<td>2.61</td>
</tr>
<tr>
<td>9</td>
<td>169</td>
<td>3.91</td>
<td>1.66</td>
<td>1.98</td>
<td>2.35</td>
<td>2.61</td>
</tr>
<tr>
<td>10</td>
<td>169</td>
<td>4.41</td>
<td>1.66</td>
<td>1.98</td>
<td>2.35</td>
<td>2.61</td>
</tr>
<tr>
<td>11</td>
<td>88</td>
<td>1.17</td>
<td>1.66</td>
<td>1.99</td>
<td>2.37</td>
<td>2.63</td>
</tr>
<tr>
<td>12</td>
<td>81</td>
<td>4.07</td>
<td>1.66</td>
<td>1.99</td>
<td>2.38</td>
<td>2.61</td>
</tr>
</tbody>
</table>

A prediction that there would be no significant difference between the mean gains in reading comprehension of Group I-E and Group II-E was made in Hypothesis 9. Since computed $t$ was 3.91, significant beyond the .01 level, Hypothesis 9 was rejected. The difference between the mean gains in reading comprehension made by Group I-E and Group II-E was significant. Group II-E made the larger mean gain in reading comprehension. It seems tenable that Group II-E, receiving the experimental treatment in
the second cycle of the study, was influenced by teacher effort toward academic achievement at the end of the school year and the use of the experimental questioning procedures.

Hypothesis 10 stated that there would be no significant difference between the mean gains in reading comprehension of Group I-C and Group II-C. Hypothesis 10 was rejected because computed \( t \), 4.41, was significant beyond the .01 level of confidence. There was a significant difference between the gains in reading comprehension made by the control groups. Group I-C made the larger mean gain in reading comprehension.

A possible explanation for these findings is that Group I, serving as the control group during Cycle II of the study, was influenced by the extra effort for academic achievement put forth at the end of the school year.

No significant difference between the mean gains in reading comprehension of Group I-E and Group I-C was predicted by Hypothesis 11. Since computed \( t \) was 1.17, outside the .05 level of confidence, Hypothesis 11 could not be rejected. The mean gain in reading comprehension made by Group I, Experimental, was not significantly different from that of Group I, Control. Group I-C made the greater mean gain in reading comprehension. It might be conjectured that the use of selected questioning procedures by Group I when they served as the experimental group had some carry over to their behavior as control group subjects.

Hypothesis 12 stated that there would be no significant difference between the mean gains in reading comprehension of Group II-E and Group II-C. This hypothesis was rejected because computed \( t \), 4.07, was significant beyond the .01 level of confidence. The larger mean gain in
reading comprehension was made by the experimental group. Group II-E made a significantly larger mean gain in reading comprehension than did Group II-C. These results further verify the findings for Hypotheses 7 and 8, that reading comprehension is enhanced by the use of the experimental questioning procedures.

Findings Not Specifically Related to the Hypotheses

### Mean Gains in Curiosity and in Reading Comprehension for Combined Groups

The mean gains in curiosity and in reading comprehension were computed for the combined experimental and combined control groups. Table XI presents this data. The mean gain in curiosity for Groups I-E and II-E combined was 14.9. Groups I-C and II-C combined had a loss in level of curiosity (mean, -11.4). A reading comprehension mean gain of 4.7 was made by Groups I-E and II-E combined, while the mean gain in reading comprehension for Groups I-C and II-C combined was 0.8. The combined experimental groups made larger gains in curiosity and in reading comprehension than

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean Gain Curiosity</th>
<th>Reading Comprehension</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-E + II-E</td>
<td>14.9</td>
<td>4.7</td>
</tr>
<tr>
<td>I-C + II-C</td>
<td>-11.4</td>
<td>0.8</td>
</tr>
</tbody>
</table>
did the combined control groups. These findings further verify the results of Hypotheses 1, 2, 5, 7, 8, and 12 and indicate that the use of selected questioning procedures fosters curiosity and brings about improvement in reading comprehension.

Tests of Significance for Combined Groups

Table XII gives computed t for the difference in gains in curiosity and in reading comprehension for the combined experimental and combined control groups. The computed t for the difference in gains in curiosity for combined Groups I-E and II-E and Groups I-C and II-C was 5.72. This computed t was significant beyond the .01 level of confidence. The

<table>
<thead>
<tr>
<th>TABLE XII</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEGREES OF FREEDOM WITH COMPUTED T FOR COMBINED GROUPS FOR CURIOSITY AND FOR READING COMPREHENSION; TABLED T AT FOUR LEVELS OF CONFIDENCE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Combined Groups</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>I and II Curiosity</td>
<td>169</td>
<td>5.72</td>
<td>1.66</td>
<td>1.98</td>
<td>2.35</td>
<td>2.61</td>
</tr>
<tr>
<td>I and II Read. Comp.</td>
<td>169</td>
<td>3.72</td>
<td>1.66</td>
<td>1.98</td>
<td>2.35</td>
<td>2.61</td>
</tr>
</tbody>
</table>

significant difference in curiosity was in favor of the combined experimental groups.

Since the computed t for the difference in gains in reading comprehension for combined Groups I-E and II-E and combined Groups I-C and II-C was 3.72, it was significant beyond the .01 level of confidence. The combined experimental groups made a larger gain in reading comprehension.
Correlation Between Gains in Curiosity and Gains in Reading Comprehension

The correlation between gain in curiosity and gain in reading comprehension was computed for each group separately and for the combined experimental and combined control groups. These data are presented in Table XIII. The level of confidence for each correlation is also given.

TABLE XIII

CORRELATION BETWEEN GAINS IN CURIOSITY AND GAINS IN READING COMPREHENSION, INCLUDING LEVELS OF SIGNIFICANCE

<table>
<thead>
<tr>
<th>Group</th>
<th>Correlation</th>
<th>Level of Confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-E</td>
<td>.211</td>
<td>.05</td>
</tr>
<tr>
<td>I-C</td>
<td>.227</td>
<td>.05</td>
</tr>
<tr>
<td>II-E</td>
<td>.263</td>
<td>.02</td>
</tr>
<tr>
<td>II-C</td>
<td>-.129</td>
<td>P &gt; .05</td>
</tr>
<tr>
<td>I-E and II-E Combined</td>
<td>.192</td>
<td>.02</td>
</tr>
<tr>
<td>I-C and II-C Combined</td>
<td>-.072</td>
<td>P &gt; .05</td>
</tr>
</tbody>
</table>

The correlation between gains in curiosity and reading comprehension was .211 for Group I-E and .227 for Group I-C. Both of these correlations were significant at the .05 level of confidence. Gains in curiosity and in reading comprehension correlated .263 for Group II-E. This correlation
was significant at the .02 level of confidence. The correlation of -\.129 between curiosity and reading comprehension for Group II-C was not significant since the level of confidence was greater than .05.

The correlations between gain in curiosity and increase in reading comprehension were significant for all of the four groups except one, Group II-C. Group II had a negative correlation between gain in curiosity and increase in reading comprehension when it was the control group, but the largest positive correlation was found for it when it served as the experimental group.

The gains in curiosity and in reading comprehension for the combined experimental groups, Group I-E and Group II-E, correlated .192. This correlation was significant at the .02 level of confidence. The correlation between gains in curiosity and in reading comprehension was -.072 for Group I-C and Group II-C combined. This correlation was not significant, since it did not reach the .05 level of confidence. The combined experimental groups' gains in curiosity and in reading comprehension correlated significantly, but the gains made by the combined control groups did not.

In this chapter the findings of the study were presented. Chapter V will report selected observations.
CHAPTER V

A DISCUSSION OF SELECTED OBSERVATIONS

In a pioneer experimental study there are observations which seem noteworthy and which grow out of direct administration of the experimental procedures. Therefore, it seemed pertinent to provide a discussion of such observations which might further clarify the data obtained from the study. This chapter is devoted to a discussion of such selected observations.

Traditionally the emphasis in school has been on purveying knowledge. The teacher's role has been that of one who not only asks the questions but also provides students with the teacher-approved answers. In this type of academic structure the cognitive growth of students is inhibited. The questions which teachers direct to students are almost exclusively ones which require students only to memorize information and recall it or which ask students to classify previously acquired knowledge.

Both of these types of questions call for convergent responses. They encourage students to learn and retain predetermined information. The type of question that promotes memorization usually requires only a short response. For example, "When did the Civil War begin?"

Some extension of the information under consideration is necessary when responding to the type of question which requires students to
classify previously acquired knowledge. The student is asked to classify, compare, contrast, or substitute his previously acquired knowledge. An example of this type of question might be, "How are the compositions of these four musicians alike and how do the works of one of them differ from those of the others? (Chopin, Bach, John Philip Sousa, Beethoven)"

This type of question requires the child to use a higher form of cognitive skill than does the question which asks for recall of memorized information, but both of these question types promote convergent thinking.

Some teachers may unintentionally perpetuate the conventional practice of largely confining learning and thinking in the classroom to little else than memorization and classification of information. A fear of losing control of the instructional process or general insecurity in their teaching may cause other teachers to set narrow limits on student thinking.

Memorization and categorization of previously acquired information are cognitive skills which students must master, but whenever student intellectual development allows, other types of questions should be introduced into classroom instruction. In the experimental groups for this study, two types of questions which focus on intellectual discovery and innovation were purposefully employed whenever possible.

The first type of question, which is in the mode of thinking which emphasizes intellectual discovery and innovation, calls for interpretation and making inferences. It requires the child to transform information from one situation to another. For example, "What position might Teddy Roosevelt take with regard to the present U.S. foreign policy if
The type of reasoning called for actually has no right response and must be evaluated on the basis of the quality of judgment shown by the respondent at his level of intellectual development.

Questions which call for prediction of consequences were also used as extensively as possible in the experimental groups for this study. The structure of such questions usually follows a pattern of giving the student the "if" part of a statement and then of expecting him to supply the "then" portion to complete the prediction. For example, "If our world population continues to increase, what are some of the possible effects this will produce in the year 2000?"

These two types of questions which require interpretation, inference making, and prediction encourage divergent thinking. They focus on what is yet to be discovered. A divergent mode of thinking is fostered through the use of these questions when respondents actively engage in the intellectual challenge such queries present for manipulating ideas. (For a more thorough description of the four types of questions mentioned in this discussion, see Appendix H, pages 160-162.)

Experimental group students seemed to gravitate toward the problem-solving situations created by the use of questions which promote divergent thinking. They were caught up in the excitement of searching for possible modes of attack on the problems which were posed. Student reaction to the nature of the problem presented might be described as the first phase of a cognitive process. Intellectual curiosity was aroused.

Since much information can be acquired through listening and reading, these two facets of communication were employed by the students in experimental group settings to obtain the additional information necessary to
enable them to cope with the intellectual exercises which challenged them. These students appeared to be intrinsically motivated to listening or reading, because they had a deep desire to find something out. This arousal of curiosity seemed to enhance student comprehension of what was heard or read, because it gave purpose to their activity.

The final phase of the cognitive process involved student response to the ideas encountered through the query to find something out. This response involved utilization of the discovered knowledge in any manner which seemed most logical to the individual student. He might be inventive and imaginative in his response to that which he had learned or he might respond critically. In any event, the process is incomplete until the learner has made some use of ideas and has communicated his findings to others.

This cognitive process is diagrammed below as it might be described for an individual learner.
The continuous lines represent a smooth, uninterrupted flow of the process. The broken lines depict any point in the process where the student withdraws from the learning situation. Student withdrawal can permanently halt the cognitive process or temporarily impede it. The return to the process after a temporary detour is shown with continuous lines leading back to the path which flows smoothly. The five phases of the process are numbered.

In an instructional setting where questions calling for divergent responses are purposefully employed whenever possible, as in the experimental groups in this study, some students may not engage in the cognitive process. The withdrawal of such students may be due to the fact that the question(s) or problem(s) posed may be beyond their level of intellect. If this situation persists their anxiety will increase.

Teacher intervention can restore the withdrawn learner to participation in the cognitive process by confronting him with a curiosity-arousing question which is appropriate for him at his level of intellectual development. In like manner, teachers can restore the flow of the cognitive process by the skillful use of questioning at any point where it may be interrupted. Questions which increase curiosity provide an intrinsic motive which directs, channels, and sustains purposive problem-solving behavior.

The cognitive process can be enhanced or inhibited in an instructional situation by the intellectual climate that prevails. The nature of the intellectual atmosphere can be determined by teacher attitude. A stimulating climate for thinking and learning prevails when the teacher serves
as a model for his students, assuming the role of learner as well as that of teacher. In this role, he evidences acceptance of and respect for student thinking. This attitude is expressed by his encouragement of students to raise questions and his helping students improve their questioning skills.

The student who engages in the cognitive process should experience intellectual growth. He should organize his thought processes and develop thinking patterns which enable him to effectively meet the problem-solving situations with which he is confronted. As the questioning attitude is fostered in the individual learner, he should gain increasing independence. There should be a gradual refinement of his ability to raise the questions that will give direction to his quest to know and meaning to his discoveries.

Student curiosity must be fostered in the instructional setting if a larger proportion of students are to develop the intellectual skills they need to realize their maximum potential. It is much easier and safer to converge thinking and learning upon predetermined knowledge. But the challenge is toward the unknown and it must be met.
This chapter presents a summary of the research hypotheses, of procedures used for collecting data, and of findings. Conclusions are drawn about the findings, some of their implications are discussed, and recommendations are made for further research.

Summary

Hypotheses

It was the major purpose of this study to determine if the use of selected questioning procedures would increase the curiosity levels of children and facilitate gains in children's reading comprehension. More specifically, answers were sought to the following questions:

1. Does the use of selected questioning procedures produce a significant increase in curiosity 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?

Six hypotheses were formulated relevant to increases in curiosity and six hypotheses were formulated dealing with gains in reading comprehension.
Procedures

Six fifth-grade class sections from two elementary schools in a suburban school district participated intact in this research study. Subjects were divided into Group I and Group II. Each group was composed of three sections of fifth grade in one school building. There were 69 subjects in Group I and 82 subjects in Group II, making a total of 171 children participating in the study.

Sets of four categories of questions were formulated and based upon the types of reading material to be used in the study. A jury of thirteen members rated the questions on the extent to which they would encourage, satisfy, or extend a student's moves to be curious. Two types of questions—predicting consequences and interpretation and inference making skills—met the criterion of receiving a rating of 3.5 or higher.

Curiosity was measured by employing paper-and-pencil tests of curiosity. The "Reading Comprehension Test" of the Iowa Tests of Basic Skills was used to determine the extent to which a student could read with comprehension. Three forms of both the curiosity and reading tests were administered.

The rotation-group design was used in two cycles. In Cycle I, Group I received the experimental treatment and Group II served as the control group. This treatment was rotated for Cycle II, when Group II served as the experimental group and Group I was the control group.

The two types of questions, rated by the jury as encouraging, satisfying, or extending a student's moves to be curious, were utilized by the experimental group teachers in oral and written prequestioning of students before the reading of basal reader, content area, and
recreational selections. Teachers also raised oral and written questions following the reading of selections.

Experimental teachers were furnished with a guide which contained the general plans for the study. The guide also included questions to be used with basal selections, samples of other types of questions that stimulate curiosity, and guidelines for identifying and fostering curious behavior.

Gains in curiosity and reading comprehension were computed for experimental and for control groups. These gains were analyzed by means of the two-tailed t-test.

A Report of All Findings Relevant to Hypotheses

The findings of this study and the inferences drawn from them will be limited to subjects and settings which are similar to those described for this experiment. Generalization to other situations is not intended in this discussion.

Curiosity.—Hypothesis 1, which stated that there would be no significant difference between the increases in curiosity of Group I-E and Group II-C, was rejected. Hypothesis 2, that there would be no significant difference between the increases in curiosity of Group II-E and Group I-C, was rejected.

The prediction that there would be no significant difference between the increases in curiosity of Group I-E and Group II-E, made in Hypothesis 3, could not be rejected. Hypothesis 4, that there would be no significant difference between the increases in curiosity of Group I-C and Group II-C, was rejected.
No significant difference between the increases in curiosity of Group I-E and Group I-C, predicted in Hypothesis 5, was rejected. Hypothesis 6, that there would be no significant difference between the increases in curiosity of Group II-E and Group II-C, could not be rejected.

Table XIV summarizes the findings on the hypotheses relevant to curiosity. The level of confidence for each hypothesis is also included in the table.

TABLE XIV
SUMMARY OF FINDINGS ON HYPOTHESES RELEVANT TO CURIOSITY

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Group</th>
<th>Level of Confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I-E and II-C</td>
<td>.05</td>
</tr>
<tr>
<td>2</td>
<td>II-E and I-C</td>
<td>.01</td>
</tr>
<tr>
<td>3</td>
<td>I-E and II-E</td>
<td>P &gt; .05</td>
</tr>
<tr>
<td>4</td>
<td>I-C and II-C</td>
<td>.01</td>
</tr>
<tr>
<td>5</td>
<td>I-E and I-C</td>
<td>.01</td>
</tr>
<tr>
<td>6</td>
<td>II-E and II-C</td>
<td>P &gt; .05</td>
</tr>
</tbody>
</table>

Reading Comprehension.—Hypothesis 7, that there would be no significant difference in the gains in reading comprehension made by Group I-E and Group II-C, was rejected. Hypothesis 8, that there would be no significant difference between the gains in reading comprehension of Group II-E and Group I-C, was rejected.
The prediction that there would be no significant difference between the gains in reading comprehension of Group I-E and Group II-E, made in Hypothesis 9, was rejected. Hypothesis 10, that there would be no significant difference between the gains in reading comprehension of Group I-C and Group II-C, was rejected.

No significant difference between the gains in reading comprehension of Group I-E and Group I-C, predicted in Hypothesis 11, could not be rejected. Hypothesis 12, that there would be no significant difference between the gains in reading comprehension of Group II-E and Group II-C was rejected.

Table XV presents a summary of the findings on the hypotheses pertaining to reading comprehension. The level of confidence for each hypothesis is also given.

TABLE XV

SUMMARY OF FINDINGS PERTAINING TO READING COMPREHENSION

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Group</th>
<th>Level of Confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>I-E and II-C</td>
<td>.01</td>
</tr>
<tr>
<td>8</td>
<td>II-E and I-C</td>
<td>.01</td>
</tr>
<tr>
<td>9</td>
<td>I-E and II-E</td>
<td>.01</td>
</tr>
<tr>
<td>10</td>
<td>I-C and II-C</td>
<td>.01</td>
</tr>
<tr>
<td>11</td>
<td>I-E and I-C</td>
<td>P &gt; .05</td>
</tr>
<tr>
<td>12</td>
<td>II-E and II-C</td>
<td>.01</td>
</tr>
</tbody>
</table>
Findings Not Specifically Related to Hypotheses

Gains for combined groups.---The computed \( t \) for the difference in gains in curiosity for combined Groups I-E and II-E and combined Groups I-C and II-C was significant beyond the .01 level of confidence. A significance beyond the .01 level of confidence was also found for the computed \( t \) for the difference in gains in reading comprehension for combined Groups I-E and II-E and combined Groups I-C and II-C.

In Table XVI, a summary of the findings for combined groups for curiosity and for reading comprehension is given. The level of confidence for each computed \( t \) is presented.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Level of Confidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Combined Groups I and II for Curiosity</td>
<td>.01</td>
</tr>
<tr>
<td>Combined Groups I and II for Reading Comprehension</td>
<td>.01</td>
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Correlation between gains.---The correlation between gains in curiosity and in reading comprehension was significant at the .05 level of confidence for Group I-E and Group I-C. Gains in curiosity and in reading comprehension correlated significantly at the .02 level of confidence for Group II-E but were not significant for Group II-C.

The gains in curiosity and in reading comprehension for the combined experimental groups, Group I-E and Group II-E, had a correlation which
was significant at the .02 level of confidence. The correlation between gains in curiosity and in reading comprehension were not significant for Group I-C and Group II-C combined. (See Table XIII on page 55.)

**Summary of Significant Findings**

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

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

A. **Hypothesis 1**: The difference between the increases in curiosity of Group I-E and Group II-C were significant, the difference being in favor of the experimental group.

B. **Hypothesis 2**: Group II, experimental, made a significantly greater mean gain in curiosity than did Group I, Control.

C. **Hypothesis 5**: The increase in curiosity made by Group I-E was significantly larger than that made by Group I-C.

D. **Hypothesis 6**: There was no significant difference between the mean gains in curiosity made by Group II-E and that made by Group II-C. The experimental group did, however, make the larger increase in curiosity.

E. The combined experimental groups made larger mean gains in curiosity than did the combined control groups.
II. Does the use of selected questioning procedures produce a significant mean gain in reading comprehension over the use of regular classroom procedures?

A. Hypothesis 7: The difference between the increases in reading comprehension of Group I-E and Group II-C were significant, the difference being in favor of the experimental group.

B. Hypothesis 8: Group II, serving as the experimental group, made a significantly larger increase in reading comprehension.

C. Hypothesis 11: The mean gain in reading comprehension made by Group I, Experimental, was not significantly different from that of Group I, Control. Group I-C made the larger gain in reading comprehension.

D. Hypothesis 12: Group II-E made a significantly larger mean gain in reading comprehension than did Group II-C.

E. The combined experimental groups made larger mean gains in curiosity than did the combined control groups.

The findings relevant to the two questions, as summarized above, indicate that the use of selected questioning procedures increased the curiosity levels of the subjects who participated in this study and facilitated their growth in reading comprehension.

Conclusions

Gains in Curiosity

1. The evidence suggests that the purposeful, planned use of type three and type four questions—predicting consequences and interpretation
and inference making skills—did produce a significant increase in curiosity over the use of regular classroom procedures. Perhaps such questions raised the curiosity levels of the children by posing problem-solving situations which intrigued them and caused them to desire to find out the answer to the question or solve the puzzle or problem.

In the conventional classroom, there is far too much emphasis on factual, recall questions that require students only to remember. Such questions are unlikely to stimulate curiosity because they do not challenge the child to inquire into the unknown.

The use of selected questioning procedures significantly increased the gains in curiosity made by the subjects in experimental groups over the gains made by subjects in control groups, where regular classroom procedures were employed. This was verified by the findings on every hypothesis comparing gains in curiosity for experimental and for control groups, with the exception of Hypothesis 6. There was no significant difference between the mean gains in curiosity of Group II-E and Group II-C.

Hypotheses 1, 2, and 5 findings indicate significant gains in curiosity for experimental group subjects over the gains made by subjects in control groups. Although the difference between increases in curiosity of the experimental group and of the control group was not significant, as predicted in Hypothesis 6, the experimental group did make the larger increase in curiosity. (See Table XIV, page 66.)

The findings on curiosity for combined experimental groups and combined control groups were also significant. These results further
verify that significant gains in curiosity were made by experimental
group subjects in contrast to the increases in curiosity made by
subjects in control groups. (See Table XVI, page 68.)

2. The experimental treatment was consistent since it produced
similar gains in curiosity in the two experimental groups. The findings
for Hypothesis 3 substantiate this conclusion.

3. Similar gains in curiosity were not made by the two control
groups. Hypothesis 4 findings indicate this.

While Group I served as the experimental group they were exposed
to selective questioning procedures. These questioning procedures were
intentionally withdrawn from them when they served as the control group.
The withdrawal of the experimental treatment could have caused Group I-C
to respond negatively bringing about their loss in level of curiosity.

4. The use of selected questioning procedures by the experimental
group seemed to have no significant carry over in subjects' gains in
curiosity when they served in a control group where the use of selected
questioning procedures was not purposefully teacher directed. This
conclusion is indicated by the findings for Hypothesis 5. A longer ex-
perimenatal period may be necessary to enable teachers and students to
make the use of selected questioning procedures an integral part of
their behavior.

Gains in Reading Comprehension

5. Evidently, pre-questioning of a child using questions which
encourage, satisfy, or extend a student's moves to be curious before
his reading of a written selection tends to motivate him and arouse his curiosity about the written selection. When curiosity is aroused about a written selection, the reader has purpose in his reading. He reads because he has a deep desire to find something out. He organizes his reading and thought processes in a search for the answer(s) or information which he seeks. In this process the child is achieving cognitive growth and experiencing gains in reading comprehension.

The use of selected questioning procedures significantly increased the gains in reading comprehension made by the subjects in experimental groups over the gains made by subjects in control groups, where regular classroom procedures were employed. Every hypothesis comparing gains in reading comprehension for experimental and for control groups verified this, with the exception of Hypothesis 11, in which no significant difference was found between the mean gains in reading comprehension for Group I-E and Group I-C.

Support for the findings of significant gains in reading comprehension for experimental group subjects over the gains made by subjects in control groups can be found in the results obtained when Hypotheses 7, 8, and 12 were tested. The findings on reading comprehension for combined experimental and control groups serve to indicate further significant gains in reading comprehension for experimental group subjects over the gains made by control group subjects. (See Table XV, page 67, and Table XVI, page 68.)

6. Similar increases in reading comprehension were not produced in the two experimental groups nor in the two control groups by the use of
selected questioning techniques. This is substantiated by the findings for Hypotheses 9 and 10.

In the final few weeks of the school year teachers make an effort to advance pupil progress as much as possible. Group II-E teachers were able to employ the experimental questioning procedures in this final thrust. Group I received the experimental treatment at the beginning of the semester.

Group I, as a control group, did not have the advantage of the experimental procedures, but they did made greater gains than when they were an experimental group. Perhaps this too can be explained by the extra academic effort exerted at the end of the school year. Group II, while serving as a control at the beginning of the semester, had neither the advantage of the experimental questioning procedures nor the extra thrust at the end of the school year.

7. The use of selected questioning procedures by the experimental group seemed to have significant transfer to the subjects' gains in reading comprehension when they served as control group subjects where the use of selected questioning procedures was not purposefully teacher directed. This conclusion is based on the findings for Hypothesis 11.

During the experimental period, when it was exposed to selected questioning procedures, Group I developed an inquiry approach to reading. Subjects in this group incorporated this pattern of thinking into their reading behavior and continued to use it when they were the control group, during which time the experimental questioning procedures were not employed.
Correlation Between Curiosity and Reading Comprehension

8. There was a positive relationship between the gains made in curiosity by the study subjects and the increases which they made in reading comprehension. The findings on the correlations between gains in curiosity and in reading comprehension for experimental and control groups support this, with the exception of the findings for Group II-C and the findings for the combined control groups.

The correlations between the gains made in curiosity and the increases made in reading comprehension were significant for the subjects in Groups I-E, I-C, and II-E. The findings on correlations between gains in curiosity and increases in reading comprehension for the combined experimental groups further substantiate the position that there was a positive relationship between the gains made in curiosity by the study subjects and the increases which they made in reading comprehension. (See Table XIII, page 55.)

Since the use of selected questioning procedures produced a significant gain in curiosity and in reading comprehension, it seems only logical that there should be a positive correlation between the two. The findings of this study do not, however, imply a cause and effect relationship between curiosity and reading comprehension.

The data do seem to indicate that when the groups were receiving the experimental treatment there was a correspondence between their gains in curiosity and their increases in reading comprehension. It might be concluded that the findings of this study suggest that the use of the experimental questioning procedures employed in this study does result
in a positive correlation between gains in curiosity and increases in reading comprehension.

Implications

The conclusion from the findings of this study, that the use of selected questioning procedures significantly increased the gains in curiosity made by the subjects in experimental groups, is in keeping with Berlyne's contention that questioning enhances curiosity (1, p. 289; 2, pp. 184, 189). Conclusion 5 of this study, that significant increases in reading comprehension can be fostered by the use of selected questioning procedures, concurs with the literature on questioning as an instructional procedure (3, pp. 65, 69-71; 5, pp. 1-2; 6, pp. 73-76).

The significant correlations between the gains made in curiosity and the increases made in reading comprehension found in this study suggest a positive relationship between curiosity and reading comprehension. The Maws inferred a similar relationship from a study which they made of children's curiosity as an aspect of reading comprehension (1, pp. 236-240).

The results of this study have implications for preservice and inservice teacher education. Teachers must gain an understanding of curiosity, must be able to identify the curious behavior of children, and must recognize the importance of fostering curiosity in themselves and in their students. Motion picture films or video tapes of children exhibiting curious behavior and of teachers encouraging student curiosity could be beneficial for use in teacher education. Teachers might do
observations of elementary student behavior and focus these observations on the curiosity of children.

Teachers should develop their questioning skills in the instructional setting so that they may stimulate curiosity. Lessons can be taped to make possible teacher self-evaluation of verbal facility in questioning. Lesson sequences might be videotaped to enable teachers to view their verbal and nonverbal questioning behavior.

Elementary school students should develop respect for questioning as one of the most useful learning techniques. They need to be sensitive to the quality of the questions which they initiate. Through teacher guidance of pre-questioning before reading, students should develop skills in mental questioning of the author in reading. This use of questioning as a learning tool should foster questioning of the speaker in listening and student self-questioning in thinking and in oral and written communication.

Students should receive instruction in the art of questioning. Teachers and students can develop lists of questioning patterns which would help to elicit various kinds of information. The pattern, "When did _____ occur (begin, end)?" calls for factual information, for example. A questioning pattern such as "If _____, what are some of the results of this change?" requires a prediction of consequences to complete the statement.

The findings of this study indicate that the use of questions which develop interpretation and inference making skills and which require the prediction of consequences enhances students' reading
comprehension. Questions such as these should be used extensively in the developmental reading program. Basal readers and other instructional reading materials should include numerous suggested questions from these categories. Purposeful teacher utilization of questions of this type will develop readiness and set purposes for reading a selection and promote student follow-up discussion of selections which students have read.

The instructional materials used in the public schools should encourage teachers and students to use questions that stimulate cognitive growth. Textbooks, courses of study, general reference materials, and recreational reading materials should be evaluated as to the extent to which they require students not only to remember ideas but also to use them.

Any effort toward improvement of questioning in the learning environment carries implications for educational evaluation. If questions which foster divergent thinking facilitate pupil achievement in reading comprehension and encourage curiosity when used in oral and written exercises, they should also be utilized in the process of evaluation.

Recommendations for Further Research

Instruments for measuring curiosity in subjects younger and older than the fifth-graders for whom the Maws designed their paper-and-pencil tests are needed. Such instruments would permit the study of curiosity at all age levels. A need exists for studies to determine whether there is a chronological age(s) when the level of curiosity is at its height and whether there are age levels when curiosity declines. Tests for
measuring curiosity in individuals are needed so that the curiosity level of the individual child can be accurately identified.

The research reported here should be replicated by use of type one and type two questions—developing memory skills and developing composite skills—in questioning procedures. The findings from this research could determine whether other types of questions would also produce significant gains in curiosity and in reading comprehension.

Also needed is a study which extends the present research to include analysis of student responses to questions. Study of the sequencing and pacing of questions in instruction would also add to the research in this area. A teacher should take advantage of teachable moments when a child's behavior indicates that his curiosity has been aroused and questioning can enhance his curiosity and lead him into intellectual inquiry.

A study should be made of developmental reading materials currently being offered by publishers to determine the extent to which the questions which they prescribe are of the type which stimulate curiosity. It would also be beneficial to survey textbooks and other instructional materials being used in social studies, science, mathematics, and other areas of study for evidence of activities and projects which promote divergent thinking.

A study is needed to determine the relationships among students' gains in curiosity and their gains in various school subjects. The specific nature of such relationships needs to be known.

Further research studies should be carried out in instructional settings in order to identify factors other than questioning which
encourage curiosity and foster reading comprehension. There is also a need to identify the factors which lessen children's curiosity and impede their progress in reading comprehension.

Even though this study was restricted to the fifth-grade level and was conducted in the classroom setting, the findings have general implications for all age levels in formal and informal learning situations. The present study should be replicated for other grade and age levels and with subjects and in settings which differ from those described for this experiment.
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Books


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**Articles**


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**Publications of Learned Organizations**


Reference Books


Unpublished Materials


APPENDICES
THE YOU TEST

Battery A

This series of short tests is called THE YOU TEST. It is given this name because it asks you what You Think, what You Believe, what You See, what You Would Do, and what You Know. In addition, you will be asked to show how well You can solve puzzles and to write questions You want answered.

In some of the tests, the correct answer is what You think or believe. You will be told that there are no right or wrong answers for these tests.

In other tests, you will need to give or work out the correct answers. You will be told that a correct answer is required.

You must work on one test at a time. You may not go ahead to the next test nor return to work on earlier ones. The examiner will tell you when to begin each test and when to stop. Work as quickly as you can, but try to be as accurate as you can be. Try hard to give what you think is the correct answer for each item.

PLEASE STOP

DO NOT TURN PAGE

UNTIL TOLD TO DO SO.
WHAT WOULD YOU DO?

Directions: In each of the questions below, mark the thing you think you would do or would prefer to do if you had to do one of the four. There is no wrong answer. You may prefer to do one thing and someone else may prefer to do something different.

1. If you could have any of the following for your birthday, would you select:
   __ a phonograph
   __ a badminton set
   __ a checker game
   __ a microscope?

2. If you had a dollar, would you:
   __ buy a big bag of candy
   __ buy a toy
   __ buy a book
   __ buy some fruit?

3. If you were alone, would you:
   __ dream of what you want to be when you are older
   __ read a funny book
   __ take apart small things like an old alarm clock
   __ take a nap?

4. If someone gave you a trick toy bird that would sit still for a few minutes and then wave its wings, would you:
   __ try to keep it as new as you could
   __ try to find out how it works
   __ show it to your friends
   __ play with it until it wears out?
5. If you had a favorite movie star, T. V. star, or baseball star, which would you rather do:

___ collect pictures of the star
___ write letters to the star
___ draw pictures of the star
___ find out all you could about his or her successes and failures?

6. If on your way to school you saw a strange bird, would you:

___ forget about it
___ try to identify it by guessing
___ try to identify it by comparing it with pictures
___ ask your teacher what it is?

7. If someone said that he had a counterfeit dollar bill, would you say:

___ "I don't believe it."
___ "It looks like any other dollar bill."
___ "Let me feel it."
___ "Let's look at it and a real one under a reading glass."

8. If you were grown up, would you want to be:

___ a teacher
___ a clerk in a store
___ a farmer
___ a detective?

9. If you found a strange insect, would you:

___ step on it
___ pay no attention to it
___ call others to see it
___ watch and see what it would do?
10. If you went to the library to get a book would you select:

_____ A Child's True Facts About the Moon.
_____ Dale's Dream About His Trip to the Moon
_____ The Story of the Man in the Moon
_____ A Book of Poems About the Moon?

11. If you had to do one of the following, which would you select?

_____ learn a poem by heart
_____ find answers to questions
_____ paint pictures for social studies
_____ study spelling

12. If you had enough money to travel, which would you like to visit first:

_____ countries in Europe where English is spoken
_____ cities in Asia
_____ the upper part of the Congo River in Africa
_____ countries in Europe where languages other than English are spoken?

13. If you were out of school, would you want to:

_____ keep the books in a store
_____ hunt for new minerals
_____ work in a library
_____ serve the passengers on an airplane?

14. If you were in a room with all kinds of maps, would you look first at maps of:

_____ your city
_____ the routes to a nearby city
_____ the USA
_____ the ancient world?
15. If you heard a strange noise, would you:
   ___ run away as fast as you could
   ___ invent a make-believe story about the noise
   ___ try to find out what caused the noise
   ___ pretend you didn't hear the noise?

16. If you were given a puppet, would you:
   ___ pull the strings to see the legs and arms work
   ___ spend enough time to learn how to make the parts work well
   ___ forget about it because the strings got mixed up too easily
   ___ ask someone to work it for you?

17. If you were at home and the mailman came, would you:
   ___ wave at him
   ___ rush to the mailbox to see what he brought
   ___ leave the mail in the box
   ___ ignore the mailman?

18. If you saw a pile of leaves moving up and down, would you:
   ___ walk away from it
   ___ throw rocks at it
   ___ think the wind was blowing the leaves
   ___ find out what was making it move?

19. If someone showed you an amazing trick, would you:
   ___ ask the person to show you how to do the trick
   ___ tell the person that you can do better tricks
   ___ enjoy the trick and then forget it
   ___ think the person had a magic power which you did not have?
20. If you were coming to the end of an interesting story and your friends were outside asking you to come out and play, would you:

_____ drop your book

_____ tell your friends that you would join them later and finish reading

_____ mark your place

_____ ask them where they would be later?

21. In science class would you prefer:

_____ to learn to spell the names of animals

_____ to give reports on your readings

_____ to do experiments to find answers to questions

_____ to look up answers to questions in your books?

22. If you went to a dog show and one of the dogs was behind a sign marked "SAMOYEDE," would you:

_____ think the name was wrong

_____ write it down and look in an encyclopedia to see if there was such a dog

_____ notice carefully what the dog looked like

_____ forget about it?

23. If you belonged to one club and some of your classmates belonged to another, would you:

_____ pretend you did not know about the other club

_____ try to find out what they did in the other club

_____ keep them from finding out what you did

_____ tell them that your club was the better club?
24. If your mother bought you a new coat that the salesman said was made from coal, would you:

   _____ laugh at him
   _____ feel the coat
   _____ ask him how the coat was made
   _____ think you had something special?

25. If you had coins in a bank, would you

   _____ take them out and play with them
   _____ stack them into piles
   _____ see how many coins you had
   _____ look at the date on each coin?

26. If you were told to go to the library and pick out any book you wanted, would you pick one that:

   _____ had pretty pictures in it
   _____ was written by someone whose books you had read before
   _____ was easy to read
   _____ told you how magicians did their tricks even if it were hard to read?

PLEASE STOP

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UNTIL TOLD TO DO SO.
WHICH SAYING DO YOU BELIEVE?

Directions: All of you have heard many old sayings. If you stop to think of what they mean, you find that some are opposite to others. Below are listed pairs of sayings. Please mark the one of each pair that you believe is more nearly true most of the time.

1. _____ Don't bite off more than you can chew.
   ______ Anything is possible.

2. _____ Dare to follow the truth.
   ______ Don't rock the boat.

3. _____ Fortune favors the brave.
   ______ It's better to be a live coward than a dead hero.

4. _____ Ignorance is bliss.
   ______ Only the wise can see the true beauty of life.

5. _____ Don't change horses in the middle of the stream.
   ______ It's never too late to change.

6. _____ He who acts on impulse seldom wins a prize.
   ______ Seize the opportunity when it presents itself.

7. _____ Let well enough alone.
   ______ Never do things by halves.

8. _____ First study, then act.
   ______ First thoughts are brilliant.

9. _____ Be good, and let who will be clever.
   ______ Seek knowledge so you may act wisely.
10. You don't know what you can do until you try.
   Never start a thing you can't finish.

11. Keep the common road and be safe.
   The best view is from the heights.

12. Second thoughts are wise.
   The quick answer is usually the right answer.

13. All things come to him who waits.
   Who stands still in the mud sticks in it.

14. Let well enough alone.
   Nothing like trying.

15. It's never too late to change.
   You can't teach an old dog new tricks.

16. A bird in the hand is worth two in the bush.
   Coins in a locked box earn no interest.
Ann and Jim were in Africa with their parents. Their father hired a boat to take them up a river that ran through a dense jungle. Suddenly Jim cried out, "I can see six wild animals." "I can see seven," said Ann. HOW MANY CAN YOU FIND? Draw a circle around each animal.
CODE PUZZLE

Directions: Can you solve the following codes? Why don't you try? You will get credit for each letter, extra credit for each word, and still more credit for each message. Each sentence really tells something. Write each letter on the line below the sign you are solving.

(1)

\[ I + JX 40V + T + lx \]

\[ \text{Sameryl} \]

(2)

\[ \text{Every陈列} \]

\[ \text{Ria teh A} \]

\[ \text{Resil} \]
YOU ASK THE QUESTIONS

Directions: Read the following story and answer the questions.

It was a dark night and the train was moving at seventy miles an hour. The engineer was keeping track of where he was by counting the signal lights. He did not know that some of the lights had been shot out. Suddenly he came to a sharp bend and he knew that something was wrong.

DID YOU LIKE THIS STORY? YES NO

WHY DID YOU LIKE OR NOT LIKE THIS STORY?

WHAT ELSE WOULD YOU LIKE TO KNOW ABOUT THIS STORY? Write as many questions as you can. Use the back of this page if necessary.
THE TRIP TO THE ZOO

(READ THE FOLLOWING STORY AND ANSWER THE QUESTIONS AT THE END OF IT.)

The members of the class had been to the zoo. Miss Smith, their teacher, had told them that they would have to write a report about their trip. One of the pupils wrote the following report.

"We got on the bus early Tuesday morning. It was a beautiful morning and we all enjoyed our two-hour trip to the zoo. We sang songs all the way.

"Our first stop was at the monkey house. Some of the animals were little and cute. Others were big and ugly. In one cage, there was a gorilla that stood up and pounded his chest. He was very, very big. One monkey was a little fellow whose eyes and ears looked to be as big as he was. He was called the Bush Baby of Africa. One little animal called a ruffed lemur was reddish brown and was eating insects. There was a spider monkey that had a tail that was twice as long as its arms.

"Our next stop was at the lion house. There were really all kinds of cats in this house. There was one animal that the sign said had a mother that was a tiger and a father that was a lion. It was called a liger. There was a red lynx that looked so much like my own 'Tabby' that I wanted to pet it. They were feeding the lions and the lions were making a lot of noise. The lion is sometimes called the king of beasts. One fierce-looking animal is the jaguar. It can be found in the southern part of the United States. The guide told us that this animal had killed a horse and had eaten most of it. It could kill a man, but it had been captured after a small dog ran it up a tree.

"On the way to the house where the water animals are kept, we stopped to watch the keepers throw fish to the seals. Seals can get sunburned easily and can't lie too long exposed to the sun, even if they are lying on ice. They made a lot of noise like a honking bus.

"The largest creature at the water-animal house was a shark. It looked as if it were grinning all the time. Our teacher said that she had read that the shark is the only animal that never sleeps or rests. If that is true, sharks must get very tired. The class asked the guide why the zoo did not have a whale. He said that whales are too large. They need lots of room to play since they like to jump out of the water. Sometimes they jump twenty feet into the air.

"At one end of the water-animal house there was an alligator pit. Some people said that the animals were crocodiles. I can't tell the difference. They are both ugly. We also saw some strange snakes and frogs. In one cage there was a rattle snake and in another a boa constrictor. The boa constrictor was large enough to swallow a pig. In one cage, there were frogs. One little
frog from West Africa had hair instead of smooth skin. It looked funny. While I was watching it, I thought I heard someone in the class whistle. It was then that I saw the whistling frog. It wasn't much larger than a green frog and was trying to catch flies with its long tongue. It caught some flies, but many got away. The guide told us that flies have 8000 eyes, but they cannot see very well.

"The guide told us that some animals need a lot of water. Even camels drink water when it is around. The guide said he had never seen a prairie dog drink water. The prairie dogs lived in little burrows and kept coming out, looking around and then scampering into their holes. The guide also told us about the Koala Bear from Australia that gets its water by eating plants when they are covered with dew.

"There are several strange animals from Australia. The kangaroo carries its babies in a pouch. It has to do this because a baby kangaroo is about the size of a postage stamp. Kangaroos can be trained to box and grow to be very large.

"We then went to eat. Outside of the shelter, wasps had left some of their work. It looked like paper. Miss Smith told us that paper had been made by wasps before people learned how to make it. She also said that we got the different things we were eating from different parts of the world. One of the students had corned beef from South America. I had tapioca pudding. Miss Smith said that tapioca came from a root that is deadly poison. I like tapioca just the same.

"After lunch we went to see the birds. The big two-toed ostrich was looking all around. It has big tail feathers. We have a picture of my great grandmother wearing a hat trimmed in ostrich feathers. The prettiest bird we saw was a peacock. It had spread its wings into a beautiful fan of many colors.

"The guide told us that this was the way the peacock called its mate. The guide also told us about a Bower Bird that builds a nest of flowers for his mate. He also told us about a woodpecker finch that uses a stick to pry insects from wood.

"Some birds can sing and others cannot. The stork cannot make any sound except by banging its beak together. The woodcock sings with its wings as prettily as a canary does with its throat. Another bird, the finfoot, growls like our dog Rex.

"Animals that have no voices 'talk' with other animals. Bees 'talk' by dancing in the air. Giraffes 'talk' with their tails. Other animals can make many sounds. There was a crow at the zoo who kept shouting, 'Who are you?'

"In one cage, there were many little humming birds. They seemed to be moving very fast. Some of them were flying backward. Our guide told us that birds are fast animals. The road runner can run faster than a horse and a sea bird, the Frigate bird, can fly faster than 250 miles per hour."
"We visited a section of the zoo where they had animals that looked like horses. We all enjoyed watching the zebras run about. Someone said they looked like prisoners in stripes. In the next section, there was a tiny donkey with shaggy hair. It looked like a big dog. The sign said it was from India.

"One of the children told about riding a burro to the bottom of the Grand Canyon. Our guide said that animals of this kind were used all over the world. He said that on one island they made donkeys wear trousers on the street. Miss Smith laughed and said she saw elephants when she was in Ceylon that were dressed in lace trimmed pants.

"As we were getting on our bus to come home, a dog was chasing a squirrel. The squirrel ran up the tree. Did you know that a squirrel can climb a tree faster than it runs on the ground? I didn't.

"I had a good time on my trip to the zoo."

1. DID YOU LIKE THIS STORY? YES NO

2. WHAT DID YOU LIKE ABOUT THE STORY?
QUESTIONS ABOUT
THE TRIP TO THE ZOO

Not so long ago, you read a story about a trip to the zoo. Below are statements about that story. Some of the statements are exactly what was said in the story. Put an X in front of them. Other statements are not exactly what was said in the story. Put a 0 in front of them.

1. The class went to the zoo on Tuesday. X
2. The trip to the zoo was one-hour long. X
3. A big ugly ape pounded his chest. X
4. The class saw a small big-eyed monkey called a Bush Baby. X
5. The spider monkey has a very short tail. X
6. A liger has a mother that is a tiger and a father that is a lion. X
7. A red lynx looks like a big house cat. X
8. The jaguar is found in the United States. X
9. The jaguar will fight and kill all domestic animals such as the horse and dog. 0
10. Seals have very tough skin that protects them from freezing and getting sunburned. X
11. Sharks sleep by floating just under the surface of the water. X
12. Whales are big creatures and they sometimes leap twenty feet out of the water. X
13. Alligators and crocodiles look very much the same. X
14. A rattle snake can swallow a pig. X
15. All frogs are covered with smooth, hairless skin. 0
16. Some frogs can whistle. X
17. The housefly has 8000 eyes. X
18. Camels drink water when they can get it.
19. The zoo keeper has to give prairie dogs a lot of water or they will die.
20. The Koala Bear gets water by eating leaves covered with dew.
21. Baby kangaroos are smaller than postage stamps.
22. Human beings were the first creatures to make paper.
23. Tapioca is made from a poisonous root.
24. The ostrich has two toes.
25. Ostrich feathers were once used to trim hats.
26. The prettiest bird that the class saw was the Bower Bird.
27. The woodpecker finch makes a nest of flowers for his mate.
28. The finfoot uses a stick to pry out insects.
29. The stork sings a beautiful song.
30. The woodcock sings with his wings.
31. Giraffes "talk" with their tails.
32. Hummingbirds can fly backwards.
33. There are no birds that can run as fast as dogs and horses.
34. The Frigate bird can fly faster than 250 miles per hour.
35. In India there is a shaggy donkey that looks like a big dog.
36. At the zoo there were donkeys that wore trousers.
37. The teacher said she had seen elephants with lace pants in Ceylon.
38. A squirrel can climb a tree faster than it can run on the ground.
39. The teacher's name was Miss Smith.
40. The pupil had a good time at the zoo.
WHICH TO DISCUSS?

You are told that there is a story about each figure in the sets below. If you could hear only one story for each set, which one of the three signs would you select? Draw a circle around the one sign in each set you would want to discuss.

1. [Diagram of four symbols]
2. [Diagram of four shapes]
3. [Diagram of three shapes]
4. [Diagram of three symbols]
5. [Diagram of three shapes]
6. [Diagram of three shapes]
7. [Diagram of three shapes]
8. [Diagram of three shapes]
9. [Diagram of three shapes]
10. [Diagram of three shapes]
11. [Diagram of three shapes]
12. [Diagram of three shapes]
This series of short tests is called THE YOU TEST. It is given this name because it asks you what You Think, what You Believe, what You See, what You Would Do, and what You Know. In addition, you will be asked to show how well You can solve puzzles and to write questions You want answered.

In some of the tests, the correct answer is what You think or believe. You will be told that there are no right or wrong answers for these tests.

In other tests, you will need to give or work out the correct answers. You will be told that a correct answer is required.

You must work on one test at a time. You may not go ahead to the next test nor return to work on earlier ones. The examiner will tell you when to begin each test and when to stop. Work as quickly as you can, but try to be as accurate as you can be. Try hard to give what you think is the correct answer for each item.

Please stop
Do not turn page
Until told to do so.
WHICH DO YOU THINK ARE FOOLISH SAYINGS?

Directions: Some of the following statements have parts in them that make them foolish. Other statements are all right. Put an X before the foolish ones; put a C before those that are all right.

Be careful; don't laugh out loud. If you do, you will spoil the fun for your friends. You may laugh at something they don't think is foolish.

1. Bob said to Jack, "I'll meet you at the lodge. If I get there first, I'll make a chalk mark on the door. If you get there first, rub it out."

2. The soldiers were outnumbered so they gave up without a fight.

3. A man who was charged with driving at the rate of 70 miles per hour insisted that he could not be guilty since he had been out driving for only one-half hour.

4. On their trip to the fire station, none of the little children wanted to be last in line. The kind teacher solved the problem by letting the last child in line come up and walk with her.

5. The soldier said, "If I have to choose between spending the rest of my life in jail or in the grave, I'll choose jail."

6. His uncle is twice as old as my father was when I was born.

7. John wanted to be a basketball player. He practiced an hour every evening before he started his homework.

8. My grandparents have no daughters and no sons.

9. She picked up the melted ice cubes and dropped them into the pail.

10. Helen said, "I have three sisters: Mary, Susan, and myself."

11. Mrs. Jones mailed her order to the store. At the bottom of the order she wrote, "Please let me know if you do not receive this order."

12. Father said, "Come to the table and I will show you how to play the game."

13. The captain said, "Don't shoot until you see the whites of their eyes."

14. The ladder broke when my father was painting the house. Luckily he was not far from the ground when it happened, so he was not hurt.
15. It is a week from Christmas to New Year's but almost twelve months from New Year's to Christmas.

16. There have been no girls born in my family for the past three generations.

17. The people pushed forward to see what had happened. They made it impossible for the rescue teams to work.

18. The family had taken a long vacation. They told their neighbor that they had taken over 200 pictures.

19. He ran quickly up the stairs and hurried down the hall. He was hoping he would be late for his first class.

20. The sunlight pouring in through windows on all four sides of the room made such a glare that I hurried to pull the blinds.

21. If you can't read type of this size, you need glasses.

22. Why is Sam Brown so stingy with his son? He has so much money that he could give his son half of it and still be the richest man in a very wealthy family.
WHAT DO YOU KNOW?

Directions: All pupils learn many facts. Some of the facts are learned in school; a large number are learned from other places. How many of the following facts do you know? Mark an X in front of the correct ending for each of the following items.

1. The president of the United States who was once a surveyor was
   ___ Herbert Hoover
   ___ Franklin Roosevelt
   ___ George Washington
   ___ U. S. Grant

2. According to legend, the wooden horse of Troy contained
   ___ gifts for the goddess Athena
   ___ Greek soldiers
   ___ two large sea serpents
   ___ fire that destroyed the city of Troy

3. Joan of Arc
   ___ was beheaded by Henry VIII of England
   ___ was burned at the stake
   ___ died in battle
   ___ was accidentally shot by a French soldier

4. Venus is a planet that was named for a goddess. Of the planets, it is the
   ___ closest to the sun
   ___ farthest from the sun
   ___ second closest to the sun
   ___ farthest from the earth
5. The wife of John Adams was a person of great ability. Her name was
   ___ Abigail
   ___ Audrey
   ___ Alice
   ___ Aletha

6. The United Nations is an organization of nations that works for peace in the world. Its meeting place is
   ___ Paris, France
   ___ London, England
   ___ Washington, D. C.
   ___ New York City

7. A boy or girl who can do addition problems quickly might be called a good adder. Adder is also the name of a
   ___ dog
   ___ fish
   ___ snake
   ___ horse

8. Whales are large animals. Some of them are more than
   ___ 25 feet long
   ___ 50 feet long
   ___ 75 feet long
   ___ 100 feet long

9. The loom is used
   ___ in making cloth
   ___ in grinding wheat
   ___ in mining coal
   ___ in baking bread
10. Maize is another name for
   ___ rice
   ___ wheat
   ___ barley
   ___ corn

11. The humped cattle of India that have been brought into the United States are
   ___ zebus
   ___ buffalos
   ___ bison
   ___ Guernseys

12. Delaware is called the First State or the Diamond State: Maine is called the
   ___ Lighthouse State
   ___ Lobster State
   ___ Harbor State
   ___ Pine Tree State

13. Queen Victoria was
   ___ the Spanish queen who helped Columbus
   ___ queen of England in the 19th Century
   ___ the first queen of France
   ___ queen of the Netherlands during World War I

14. To square a number you must
   ___ multiply it by two
   ___ add it to two
   ___ multiply it by itself
   ___ divide it by two
15. A pint is equal to
   ____ one cup
   ____ two cups
   ____ two and one-half cups
   ____ four cups

16. The highest mountain in the world is
   ____ Mount Everest
   ____ Mount Vernon
   ____ Mount Blanc
   ____ Mount Washington

17. A diamond is made of
   ____ oxygen
   ____ hydrogen
   ____ nitrogen
   ____ carbon

18. The diet of the vampire bat of Central and South America consists of
   ____ tropical insects
   ____ the nectar of flowers
   ____ warm blood
   ____ tropical fruits.

PLEASE STOP
DO NOT TURN PAGE
UNTIL TOLD TO DO SO.
Agnes and Jerry were hunting Indian arrowheads along the creek. Agnes found six and Jerry saw five. How many can you find? DRAW A CIRCLE AROUND EACH ARROWHEAD.
RIDDLE PATH PUZZLES

On the following pages are given a number of riddles. You may guess the answers. If you want to know whether your answer is right, you can find out by solving the puzzle that follows each riddle.

You solve each puzzle in the following way:

1. Start at X.
2. Connect numbers as if you were counting 1, 2, 3, 4, etc.
3. Don't skip any numbers.
4. Don't go to smaller numbers.
5. You may move up, down, left or right (never diagonally).
6. At any point you may use the letter you run into in place of a number.
   For example, if you were connecting 1, 2, 3, 4, 5, 6 and after 4 you ran into G you would connect 1, 2, 3, 4, 6. The G would take the place of the 5.
7. If you connect the letters together in the right way, you will spell out the answer to the riddle.

Example: Suppose you guessed the answer to a riddle to be HOUSE. You would write HOUSE in the space under the riddle. Then, if you wanted to be sure, you would solve the puzzle as it is shown.

```
  2 1  X  1--2--H
  8--4--E  2 5--4
     | 12--U 5 7--0 5
     | 13 10--9--8 1 2
```

Be careful; there may be some letters that do not belong in your word.

There are no zeros in the puzzle. They are the letter 0.

Try the riddles and puzzles on the following pages when told to do so.

PLEASE STOP
DO NOT TURN PAGE
UNTIL TOLD TO DO SO.
1. "Acts like a kitten, looks like a kitten, but isn't a kitten."

What is it? ____________

   X 1 2 3 4 5
   1 0 4 C 3 1
   3 4 6 5 2 W
   2 3 7 A 1 2
   4 2 T 9 5 4

2. "Riddle me, riddle me, what is that? Over the head and under the hat."

What is it? ____________

   P 6 5 N 3 2 1 X
   12 11 10 9 4 3 2 1
   11 12 K 8 H 6 5 2
   12 A 10 9 16 5 4 3
   13 14 15 I 17 4 3 E
   14 15 12 17 2 3 4 5
   T 13 14 18 19 20 21 R
3. "Crooked as a rainbow  
    Slick as a plate  
    Ten thousand horses  
    Can't pull it straight."

    What is it?  

    1  X  3  4  K  6  7  8  
    2  1  R  3  4  5  6  H  
    3  4  3  6  1  6  5  6  
    L  5  F  7  15  11  12  13  
    5  6  5  8  9  10  9  14  
    26  25  24  23  E  17  16  V  
    R  25  23  20  19  15  16  N  
    28  26  22  21  18  L  15  13

4. "It isn't in  
    And "tisn't out  
    And the house  
    Can't do without."

    What is it?  

    6  5  4  3  2  1  X  1  2  3  4  5  6  
    7  6  5  4  3  3  1  2  3  4  5  6  7  
    8  9  6  5  4  4  2  3  4  5  6  9  8  
    9  11  N  14  15  D  3  D  15  14  C  11  9  
    10  9  12  W  22  17  4  17  22  F  12  9  10  
    11  7  11  20  19  0  5  E  19  20  11  7  11  
    12  11  I  9  8  W  6  A  8  9  B  11  12
This is a picture of a Chinese musical instrument that looks like a funny teapot.

WHAT ELSE WOULD YOU LIKE TO KNOW ABOUT THIS PICTURE? Write as many questions as you can. Use the back of this page if necessary.
A VISIT TO THE SKY THEATER

(READ THE FOLLOWING STORY AND ANSWER THE QUESTIONS AT THE END OF IT.)

Tom and his family visited the Nelson Planetarium. He decided to tell his class at school about his trip. Here is how he described his trip to his classmates.

"We took a seat in a big room with a round white ceiling. Colored lights glowed softly. Beautiful music seemed to come from all around us.

"We wondered about the strange machine in the center of the room. What is it used for? How does it work? It looked like a great monster with two heads and many eyes.

"The lights got dim. Then they went out. The ceiling was as 'black as night.' Soon a few stars appeared above us, and then more and more. The round dome was no longer just a ceiling. It was the sky--bright with thousands of stars.

"A scientist stood in a booth beside the strange machine. He explained that the big machine is a projector. It projects, or throws, lights onto the ceiling. Really it is made of many projectors working together.

"One projector throws a spot of light for the sun; another for the moon. Five projectors show the five planets that can be seen without a telescope. Forty-five other projectors each show one of the brightest stars. The big globes at each end of the machine throw 8900 spots of light for other stars.

"The machine can show the sky as it looks from the North Pole or the South Pole. It can show why we see different stars at different times of the night. It can show us how the stars change with the seasons. In the North, for example, some stars are seen only in the winter. Others are seen only in the summer.

"As we watched, the big machine showed in six minutes the stars that really pass overhead during 24 hours. It showed the moon come up and move slowly across the sky. It showed the moon changing its shape, from a thin crescent through the quarter to the full moon.

"The scientist explained that what we see in the sky is always slowly changing. He can make the machine show you how the sky looked thousands of years ago, or how it will look in the future. For example, the earth's North Pole will not always point toward Polaris, our present North Star. In fact, even today Polaris is not right at the north pole of the sky. 'About 14,000 years from now,' the scientist told us, 'another star will be closer to this north pole. Then that star will be our north star.'
"The special show we saw that night was called, 'A Trip to the Moon.' The speaker said, 'Let's take a trip to the moon!' The music got loud and jumpy. The stars began to swing about in the sky in a crazy way. Suddenly we felt as if we were on a rocket, rushing through space toward the moon.

"The moon got larger, nearer, LARGER, NEARER! There was a bright flash of light. The music stopped. All at once, we were there, right on the moon.

"We were on a great plain, flat and white. All around us were mountains with sharp points. No living thing, plant or animal, was in sight.

"High in the sky above us was the round earth. It looked blue-white, with a bright haze around it. We could see the sun and stars at the same time. The sky itself was black.

"While we looked about us on the moon, the scientist told us that the moon's sky is always black, both day and night. 'There is no air or water here,' he said. 'It is very hot where the sun shines. The temperature in some places is 215 degrees. That is hot enough to boil water, if any water were here. At night on the moon, the temperature may drop to 250 degrees below zero.'

"The scientist told about the moon's steep cliffs and its craters, or deep hollows. We could see some of these about us as he talked. He also explained the bright haze we could see around the earth. 'It is sunlight,' he said, 'reflected by the earth's air.'

"I listened carefully to what the scientist said and looked about me to learn as much as possible about the moon from this visit. The moon will be the first world that earth man visits out in space, because it is the nearest world to our earth.

"We were surprised to see that the surface of the moon is blistered with craters—hollows surrounded by high rocky walls. The scientist explained that some astronomers have seen 'puffs of smoke' near one of the moon craters. This may mean that some of the craters were caused by volcanoes.

"Other striking features of the moon, the scientist pointed out to us, were huge mountains higher than the Himalayas, crevices that look somewhat like earthquake cracks on earth, and a very jagged surface. The scientist said the main reason the moon has a jagged surface is because of its lack of water. On the moon there is no water to wear away the walls of craters or the peaks of mountains; no water to carry loose rock into the crevices until they are filled; no water to smooth the rough surface. For this reason, the moon remains the most primitive of lands.

"We were told that the moon is much smaller than the earth and orbits around the earth. We noted the strange black sky that we are told is black, even by day, for there is no air to make the sky look blue. When the scientist announced we were seeing a daytime sky, we could see not only earth and sun,
but also the stars. Even though it was day, the stars were shining brightly. "On earth," the scientist explained, "it is air that makes the stars seem to twinkle, and it is air that makes the stars impossible to see in the day. On the moon, without air to spread the sunlight, the stars are never hidden."

"While the scientist was talking, the sun suddenly disappeared from the sky. The mountains, plains, and craters of the moon were copper-red. We did not know what was happening.

"The scientist told us that we were on the moon during an eclipse, or darkening, of the moon. We could not see the earth, because the sun was directly behind it. No sunlight fell on the half of the earth turned toward us.

"We saw a red ring around the earth. As sunlight streams past the earth, it is bent by the earth's air. The red part of the bent light made the rings we saw.

"During the eclipse,' the scientist said, 'the moon gets very cold. The temperature drops one hundred degrees in just a few moments. As soon as the eclipse is over, the temperature shoots up.'

"Then the sun got lower and lower in the moon's sky. Suddenly the moon was dark except for its mountains. They caught the last of the sunlight. In another moment, everything was in deep darkness.

"Again the stars swung wildly about. The music got louder and louder. We were in space going home to earth.

"All at once we were there. Green trees and flowers were pictured around us. The sky was filled with red, pink, and orange clouds. The sun came up. The exciting show was over. It was good to be back on earth once more!

"I really enjoyed my visit to the sky theater and my trip to the moon!"

1. DID YOU LIKE THIS STORY? YES NO

2. WHAT DID YOU LIKE ABOUT THE STORY?
Not so long ago, you read a story about a visit to the sky theater. Below are statements about that story. Some of the statements are exactly what was said in the story. Put an X in front of them. Other statements are not exactly what was said in the story. Put a 0 in front of them.

1. The boy in the story visited the planetarium with his school class.  
2. The round dome slid back to reveal the beautiful night sky.  
3. Scientists are not sure about how the sky looked thousands of years ago.  
4. Our present North Star is called Polaris.  
5. In the south, some stars are seen only in the winter.  
6. The boy took a seat in a big room with a round blue ceiling.  
7. The big, strange machine was a projector.  
8. Different stars can be seen at different times of night.  
9. The boy visited the Nelson Planetarium.  
10. The special show the boy saw was called, "A Flight to the Moon."  
11. The big machine showed in six minutes the stars that really pass overhead during 24 hours.  
12. The moon comes up and moves swiftly across the sky.  
13. As soon as an eclipse is over on the moon, the temperature shoots up.  
14. Air makes the stars impossible to see in the daytime on the earth.  
15. The boy in the story felt as if he were on a rocket rushing through space toward the moon.  
16. There is little air on the moon.  
17. Earth men will probably visit the moon as their first world to reach in space, because it is the nearest world to our earth.
18. There are craters on the moon.
19. Where the sun shines on the moon the temperature rises just above freezing.
20. On the moon the stars are never hidden.
21. The earth is much larger than the moon.
22. An eclipse occurs on the moon when the sun is directly in front of the earth.
23. The mountains, plains, and craters of the moon are copper-red during the summer.
24. The bright haze around the earth that could be seen from the moon was moonlight reflected by the earth's air.
25. There are few living things on the moon.
26. The earth orbits around the moon.
27. Some scientists believe that some of the deep hollows on the moon are active volcanoes.
28. During an eclipse on the moon the temperature drops one hundred degrees in just a few hours.
29. The moon's sky is always black.
30. At night on the moon, the temperature may drop to 250° below zero.
31. The moon's surface is mostly flat.
32. The scientist said the main reason the moon has a flat surface is because of its lack of water.
33. The stars shine brightly even in the daytime on the moon.
34. From the moon, the earth would usually look greenish-white.
35. There are mountains on the moon higher than the Himalayas.
36. The boy in the story was named Tom.
37. There are deep crevices on the moon.
38. There is no water on the moon.
39. Scientists have recorded earthquakes on the moon.
40. The boy who visited the sky theater had a good time, but he was glad to be back on earth once more.
WHICH TO DISCUSS?

You are told that there is a story about each figure in the sets below. If you could hear only one story for each set, which one of the three signs would you select? Draw a circle around the one sign in each set you would want to discuss.

1.  
   ![Figure 1](image1)

2.  
   ![Figure 2](image2)

3.  
   ![Figure 3](image3)

4.  
   ![Figure 4](image4)

5.  
   ![Figure 5](image5)

6.  
   ![Figure 6](image6)

7.  
   ![Figure 7](image7)

8.  
   ![Figure 8](image8)

9.  
   ![Figure 9](image9)

10.  
   ![Figure 10](image10)

11.  
   ![Figure 11](image11)

12.  
   ![Figure 12](image12)
THE YOU TEST

Battery C

This series of short tests is called THE YOU TEST. It is given this name because it asks you what You Think, what You Believe, what You See, what You Would Do, and what You Know. In addition, you will be asked to show how well You can solve puzzles and to write questions You want answered.

In some of the tests, the correct answer is what You think or believe. You will be told that there are no right or wrong answers for these tests.

In other tests, you will need to give or work out the correct answers. You will be told that a correct answer is required.

You must work on one test at a time. You may not go ahead to the next test nor return to work on earlier ones. The examiner will tell you when to begin each test and when to stop. Work as quickly as you can, but try to be as accurate as you can be. Try hard to give what you think is the correct answer for each item.

PLEASE STOP

DO NOT TURN PAGE

UNTIL TOLD TO DO SO.
WHAT WOULD YOU DO?

Directions: In each of the questions below, mark the thing you think you would do or would prefer to do if you had to do one of the four. There is no wrong answer. You may prefer to do one thing and someone else may prefer to do something different.

1. If you were a Boy Scout or a Girl Scout, would you prefer to work on:
   ___ a stamp collecting merit badge
   ___ a first aid merit badge
   ___ a pathfinding merit badge
   ___ a safety merit badge?

2. If you were walking across an open field and you found an old golf ball that had been knocked out of shape, would you:
   ___ give it a kick
   ___ throw it away
   ___ cut it up to see how it was made
   ___ play golf with it?

3. If you could play anything you wanted to play, would you pretend you were:
   ___ a general
   ___ an Indian Chief
   ___ an explorer
   ___ a river pilot?

4. If you saw a gang of kids playing a game that you did not know, would you:
   ___ pay no attention to them
   ___ join the gang and play although you made mistakes
   ___ try to learn the rules as fast as you could
   ___ tell the gang that the game is no good?
5. If something you did not understand were mentioned in class, would you:
   ____ look it up in a book
   ____ wait for someone else to report on it
   ____ let it go until it came up again
   ____ hope the teacher would clear it up?

6. If you had a hard arithmetic problem to work, would you:
   ____ prefer to do something else
   ____ do your other school work and then work on it
   ____ try to solve it at once
   ____ get angry at the teacher?

7. If you found a secret message, would you:
   ____ look at it and let it go
   ____ consider secret messages foolish
   ____ try to read the message
   ____ copy down the message?

8. If you were given a jig-saw puzzle for Christmas, would you:
   ____ work with it until you put it together
   ____ put some of it together and then give up
   ____ pay no attention to the puzzle
   ____ trade it for another toy?

9. If you were invited to go fishing, would you:
   ____ try to find out before you left home what kind of bait the fish were
      biting on
   ____ buy some bait from a store
   ____ dig up worms and hope to catch something
   ____ take whatever kind of bait your friend told you to take?
10. If you had a dime to spend, would you:

_____ buy a grab bag that could have anything worth 1¢ to 50¢ in it
_____ buy a toy that had been in the window a week
_____ buy a piece of candy
_____ buy a pencil?

11. If your class were going on a field trip, would you like to go:

_____ to have a chance to move around
_____ because you like to go any place
_____ because you want to find out about things
_____ in order to talk with your friends

12. If you were studying history, would you enjoy most:

_____ finding out why an event took place
_____ learning dates
_____ learning the names of people
_____ studying for tests?

13. If you were on a trip to a cave with your class, would you:

_____ carry a flashlight for safety's sake
_____ enjoy the company of your classmates
_____ carry a sweater and an extra bit of food with you
_____ try to find out as much as you could about the cave?

14. If someone brought an Indian belt to school and said the figures told a story if you knew Indian sign language, would you:

_____ take his word for it
_____ look at the belt carefully
_____ find a book with Indian sign language and try to read the story
_____ try to draw some of the figures?
15. If you were handed a strange piece of fruit similar to the one a friend of yours was eating, would you:

____ refuse to eat it
____ take it home with you
____ give it back to your friend
____ try it?

16. If you heard that there was going to be a shower of falling stars at eleven o'clock in the evening, would you:

____ accept the statement as true
____ forget about it
____ ask your parents about it
____ ask your parents to help you stay up so you could see it?

17. If someone gave you a strange stamp, would you first:

____ put it in a book
____ throw it away
____ examine it for small mistakes in printing
____ ask the name of the country from which it came?

18. If your father and mother were fixing something around the house, would you:

____ complain if they wanted you to help
____ find out how they did the job
____ skip out before you had to help
____ help, but do it so they would ask you to go somewhere and play?

19. If you were going to trap an animal, would you:

____ set your trap where you thought the animal should be
____ watch for signs of the animal before setting a trap
____ first read about the animal in a book
____ set traps at any hole you found?
20. If you heard that your friend had lost his lunch money, would you:

   ___ look for a little while and then give up
   ___ tell him you were sorry
   ___ look and look until you found the money
   ___ lend him enough to buy his lunch?

21. If you were given a finger printing set, would you:

   ___ play cops and robbers
   ___ try to find prints that were left on objects
   ___ find out how it works
   ___ show the set to your teacher?

22. If you and your parents did not agree about something, would you:

   ___ try to make them change their minds
   ___ conclude that you must be wrong
   ___ conclude that your parents were wrong
   ___ try to find the facts about the matter?

23. If you were asked how sugar is produced, would you:

   ___ tell what you know
   ___ say you do not know
   ___ ask where the person asking the question thought it came from
   ___ go to a book and find out?

24. If you saw a cross-word puzzle in the newspaper, would you:

   ___ turn the page
   ___ think it was silly
   ___ try to work it out
   ___ wait until the next day to see the answers?
25. If you heard a strange sound coming from your back yard, would you:

___ wait for the sound to stop
___ go to see what was making the noise
___ ask your parents what it was
___ close the window to keep the sound out?

26. If a new child moved into your neighborhood, would you

___ continue to play with your friends and ignore the new neighbor
___ leave your friends and make friends with the new neighbor
___ try to find out what the new neighbor is like
___ stay away from the new neighbor?

PLEASE STOP
DO NOT TURN PAGE
UNTIL TOLD TO DO SO.
WHICH SAYING DO YOU BELIEVE?

Directions: All of you have heard many old sayings. If you stop to think of what they mean, you find that some are opposite to others. Below are listed pairs of sayings. Please mark the one of each pair that you believe is more nearly true most of the time.

1. _____ Where there's a will, there's a way.
   _____ What can't be cured must be endured.

2. _____ The grass is greener on the other side of the fence.
   _____ Every bird likes its own nest best.

3. _____ He who hesitates is lost.
   _____ All in good time.

4. _____ It will all come right in time.
   _____ Have you something to do tomorrow, do it today.

5. _____ Curiosity killed the cat.
   _____ Knowledge is power.

6. _____ It pays to take a chance.
   _____ Keep to the safe and sure.

7. _____ Think for yourself.
   _____ Follow the wise leader.

8. _____ What you don't know won't hurt you.
   _____ The truth will make you free.

9. _____ What is mine will come to me.
   _____ Nothing ventured, nothing gained.
10. If at first you don't succeed, try, try again.
    All things come to him who waits.

11. Look before you leap.
    He who hesitates is lost.

12. Dare to follow the truth.
    It is better to be safe than sorry.

13. Reach for the stars.
    Don't bite off more than you can chew.

14. Keep your nose to the grindstone.
    Take the line of least resistance.

15. Press ever onward, ever upward.
    Stay on the beaten path.

16. Be content with things as they are.
    Dare to be right, dare to be true.

PLEASE STOP
DO NOT TURN PAGE
UNTIL TOLD TO DO SO.
Cape Kennedy

Here we are at Cape Kennedy and a missile is about to be launched. We talked with one of the men in charge and he told us that this place has a very long history. People were living here long before Columbus discovered America. He told us that if we looked around us we could find evidence of these earlier people. We found some things. Can you? DRAW A CIRCLE AROUND EACH OBJECT USED BY THE PEOPLE WHO LIVED HERE BEFORE COLUMBUS.
CODE PUZZLE

Directions: Can you solve the following codes? Why don't you try? You will get credit for each word, and still more credit for each message. Each sentence really tells something. Write each letter on the line below the sign you are solving.

(1)

EVER Y VOY SAC

(2)

REW + A + E + Y + M + R + E + M

(3)

YER+EYI+YOLE

PLEASE STOP

DO NOT TURN PAGE

UNTIL TOLD TO DO SO.
Paul Smith's father was a mountain climber. He liked to go to the top of the highest mountains. One day he took Paul with him. It was hard work climbing to the top. When they got there, they found only bare rocks. It was too cold for trees to grow there. The sky was beautiful and they could see for many miles in all directions.

Suddenly a thunderstorm came up. Paul and his father could not get off the top of the mountain before it was upon them.

Mr. Smith shouted, "Paul! Lie flat on the rocks and don't even raise your head."

DID YOU LIKE THIS STORY? YES  NO

WHY DID YOU LIKE OR NOT LIKE THIS STORY?

WHAT ELSE WOULD YOU LIKE TO KNOW ABOUT THIS STORY? Write as many questions as you can. Use the back of this page if necessary.
A DAY IN THE AGE OF REPTILES

(READ THE FOLLOWING STORY AND ANSWER THE QUESTIONS AT THE END OF IT.)

The members of the class had visited the museum. Mr. Andrews, their teacher, asked the class to write a report about their trip. The report would be printed in the school newspaper. The report would be typed and placed in the classes' experience book.

The class decided to divide into six committees and let each committee write an account of a different part of their trip. Ralph was glad that his committee wrote on the imaginary journey back in time to the age of reptiles. The museum guide took them on this journey by seating the class in the museum auditorium, darkening the room, and using taped music and slides. Ralph's committee wrote the following report of their journey.

"The guide asked us to settle comfortably in our chairs and not to be frightened when the lights dimmed, because this would take us back in time about 135 million years into the past.

"The lights dimmed and soft music began playing. We felt that we were moving into the past. The guide explained that the day was sunshiny and very warm. We looked around and found that we were in a big, green jungle. We wondered if we were in great danger or not. We decided that we had better find a safe place for ourselves. We looked around for trees to climb. There were no oaks or elms, but there were plenty of pine trees. We picked out some large pine trees and climbed them. From the tops of them we could see very well what was going on around us.

"Over in a pond, an enormous animal was half-walking, half-floating about in the water. It had a very, very long neck and a very small head. Every once in a while it lifted its head high above the water and looked around. It did not see us in our treetops, and it came slowly out of the pond.

"Then we got a much better view of this giant animal. It was far larger than any land animal we had ever seen. We would have needed a tall ladder to climb on its back. The museum guide said that it weighed as much as a whole family of elephants. Its tail was even longer than its long neck, and its legs were like tree trunks.

"The guide explained that this great beast was one of the dinosaurs, or 'terrible lizards.' Scientists named this kind of dinosaur Brontosaurus after it died. Brontosaurus means 'thunder lizard.'

"As we watched the thunder lizard, we soon decided that it was not really terrible. We could tell from the size of its head that it must have been stupid, but it was a gentle beast. It ate nothing but plants. There was not yet any grass in the world for it to eat, but it gulped down mouthfuls of water filled with tiny green plants. The thunder lizard liked to stay in the water so that the water would help it hold up its huge body."
"Another dinosaur appeared. The guide told us that it is named Diplodocus. It was not as heavy as the thunder lizard, but it was longer. It would take at least eight big elephants standing in line to reach from its head to the tip of its tail. 'Diplodocus was the longest animal that ever walked on land,' the guide stated. 'This great reptile's head was very small. In this age, small heads, huge bodies, and almost no brains at all were the fashion.'

"Along came another dinosaur not so big as Brontosaurus and Diplodocus. It did not weigh more than a big elephant, but it was a much fiercer-looking animal. All the way down its back it wore a double row of plates made of bone. They formed a regular suit of armor. Near the end of its tail this animal had sharp spikes instead of plates. 'No wonder,' the guide said, 'that this animal is called Stegosaurus, or "armored lizard."' In a moment we saw why it needed such a heavy armor.

"With a deep growl, a really terrible reptile came out of the woods. It walked on its hind legs. We had never seen so ugly an animal. It had a huge head and very sharp teeth that showed clearly. Its body, hind legs, and tail were big and clumsy. Its front legs were so small that they looked as if they had not grown properly. They were no use in walking, but they had strong, sharp claws.

"The terrible reptile started toward the three big dinosaurs near the pond. We were glad to be high in the treetops! The armored dinosaur did not move. Its armor was a good protection. But as soon as the other two big reptiles saw the newcomer, they moved clumsily into the pond. 'They knew that the newcomer was their chief enemy—a flesh-eating dinosaur. They had no way of protecting themselves except to go into the pond. The flesh-eating dinosaur would not follow them there—it would not wade into deep water,' our guide explained.

"Another flesh-eating dinosaur joined the first. The two started to attack Stegosaurus. But then they spied a small dinosaur. They leaped after this easier prey to kill. 'You can see now,' our guide said, 'why this kind of flesh-eating dinosaur is called Allosaurus, or "leaping lizard."' The two flesh-eating dinosaurs were soon having a feast of dinosaur meat. We were happy about the fact that the flesh-eating dinosaurs could not climb trees!

"Suddenly we saw something flying through the air toward us. We thought at first that it was a big bird. But as it came closer we could see that it could not be a bird, for birds have feathers, and this animal did not have feathers. 'It is a flying reptile—one of the pterodactyls,' stated the guide. '"Pterodactyl" means "wing finger." As you look at this flying reptile, you can easily see how it got its name.' We observed that its wings were made of skin stretched from one long 'finger' of each 'hand' to its hind legs. This reptile, too, was a flesh-eater, as its sharp teeth showed. We were frightened as it came near, but it flew on down to the ground. How strange it looked as it walked about!

"Off in the distance we saw the shore of the ocean. The guide asked us if we wanted to go to the seashore. Even though we ran the risk of being caught by a flesh-eating dinosaur, we decided to go.
"We reached the shore safely. We saw at once that there were reptiles not only in the air and on the ground, but in the water, too. One huge reptile was about the shape of a fish, but it had paddles instead of fins. We could see it easily, because it did not stay under the water for long at a time. 'It could not breathe under water,' the guide informed us. It had enormous eyes, the largest eyes we had ever seen.

"Another reptile in the sea looked like a turtle that had changed its mind and decided to be a snake. Its body was big and flat like a turtle's, but its neck looked much like a snake. It held its head high above the water as it swam about.

"We decided to leave the seashore and go back to the woods to try to find something to eat. We hunted for a long time, but we could not find any food. Not a single one of the fruits or vegetables or grains we eat now grew on the earth in the days of the thunder lizard.

"As we went through the woods, insects buzzed about our heads and a little furry animal hurried out of our path. We did not pay much attention to this little animal.

"'This little furry animal is really more important than any of the animals we have seen on our imaginary journey,' the museum guide explained, 'because it is one of the first mammals—animals with hair. Most of our big animals of today—our whales, elephants, horses, cows, and many others besides—are mammals. We are mammals ourselves. In time, all the dinosaurs died. Then the mammals became the lords of the earth.'

"We got back to the seashore safely and decided to walk over to the pond. But a flesh-eating dinosaur came leaping toward us. The guide brought our journey to an end at this point by cutting off the picture, stopping the music, and turning on the lights.

"We were glad that our journey was imaginary as we spent a day in the age of reptiles! It was good to return to the age of mammals. We had enjoyed our imaginary journey."

1. DID YOU LIKE THIS STORY? YES ___ NO ___

2. WHAT DID YOU LIKE ABOUT THE STORY?
QUESTIONS ABOUT

A DAY IN THE AGE OF REPTILES

Not so long ago, you read a story about an imaginary journey to the age of reptiles. Below are statements about that story. Some of the statements are exactly what was said in the story. Put an X in front of them. Other statements are not exactly what was said in the story. Put an O in front of them.

1. There were plenty of pine trees in the big, green jungle.
2. The boy mentioned in the story is named Ralph.
3. Dinosaur means "thunder lizard."
4. The Brontosaurus was longer than the Diplodocus.
5. The class divided into four committees.
6. The Allosaurus was a dinosaur that wore a double row of plates made of bone all the way down its back.
7. The journey took the class back in time about 120 million years.
8. There was not any grass during the age of reptiles.
9. The head of the Diplodocus was very small.
10. The class members saw a pterodactyl flying through the air toward them.
11. The Stegosaurus had small front legs that were strong with sharp claws.
12. The Brontosaurus was an enormous dinosaur with a tail longer than its long neck and legs like tree trunks.
13. Near the end of its tail the Stegosaurus dinosaur had sharp spikes.
14. The Allosaurus walked on its hind legs.
15. The Diplodocus was the longest animal that ever walked on land.
16. The Stegosaurus or "leaping lizard" was a kind of flesh-eating dinosaur.
17. The class members saw a huge reptile in the water that had legs instead of fins.
18. The Allosaurus needed its heavy armor for protection.
19. It would take at least eight big elephants standing in line to reach from the Diplodocus' head to the tip of its tail.

20. The Stegosaurus dinosaur did not weigh more than two elephants.

21. The Diplodocus dinosaur was a plant-eater.

22. In the age of reptiles, small heads, huge bodies, and almost no brains were the fashion.

23. The Stegosaurus dinosaur had a huge head and very sharp teeth that showed clearly.

24. The Allosaurus was an enemy of the Brontosaurus.

25. The pterodactyl was the earliest big bird.

26. Insects buzzed about the heads of the class members as they walked through the woods on their imaginary journey.

27. One sea reptile the class members saw looked like a snake that had changed its mind and decided to be a turtle.

28. The Brontosaurus liked to stay in the water so that the water would help it hold up its huge body.

29. Pterodactyl means "wing finger."

30. Not a single one of the fruits or vegetables or grains we eat now grew on the earth in the days of the dinosaurs.

31. The pterodactyl was a plant-eater.

32. The chief enemy of the Brontosaurus and the Allosaurus was the flesh-eating Stegosaurus.

33. Mammals were the lords of the earth in the age just before the age of the reptiles.

34. The reptile in the water with the largest eyes the class members had ever seen could breathe under water.

35. The pterodactyl could walk about on the ground.

36. There were no oak or elm trees in the big, green jungle.

37. The guide explained that the little furry animals that hurried out of the paths of the class members were of little importance in this age of terrible reptiles.
38. The wings of the pterodactyl were made of skin stretched from one long "finger" of each "hand" to its hind legs.

39. The sea reptile that looked like a snake and a turtle held its head high above the water as it swam about.

40. The class enjoyed their imaginary journey to the age of reptiles, but they were glad to return back through time to the present age.
WHICH TO DISCUSS?

You are told that there is a story about each figure in the sets below. If you could hear only one story for each set, which one of the three signs would you select? Draw a circle around the one sign in each set you would want to discuss.

1. 

2. 

3. 

4. 

5. 

6. 

7. 

8. 

9. 

10. 

11. 

12. 
QUESTION RATING SCALE

Curiosity as it will be used in this instrument, will mean

Intrinsic motivation which results from strong needs or goals, a deep desire to find something out. It is a motive which directs, channels, and sustains purposive problem-solving behavior.

An elementary school child will be said to exhibit curious behavior when he

Expresses an intrinsically motivated desire to know more and more about himself and/or his environment. This strong desire to find something out finds expression in varied overt behavior. He may exhibit a puzzled expression when confronted with novel or dissonant stimuli in the environment and persist in observing and manipulating them or asking questions, listening and reading in order to satisfy his quest to know.

For a fifth-grade group which has read the following passages, please rate the questions which follow with respect to the extent to which you believe that they would encourage, satisfy, or extend a student's moves to be curious.

Circle one of the five ratings for each question.

5 **Most characteristic** of a question which extends a child's moves to be curious.

4 **Very characteristic** of a question which extends a child's moves to be curious.

3 **Only somewhat characteristic** of a question which extends a child's moves to be curious.

2 **Almost completely lacking in the characteristics** of a question which extends a child's moves to be curious.

1 **Least characteristic** of a question which extends a child's moves to be curious.
I. Long, long ago, in the northern lands of the midnight sun, people believed that a race of gods, or Aesir, as they were called, ruled the earth. A beautiful lady named Idun kept the most precious treasure of the Aesir, the apples from a magic tree. The best thing about these apples was that whoever tasted one, be he ever so old, grew young and strong again. Every morning the Aesir came to Idun to be refreshed and made over by a bite of her precious fruit. That is why in the land of the Aesir no one ever became old or ugly.

A. How were the gods of Aesir like modern-day man? 5 4 3 2 1

B. What might be the consequences of a discovery of something to help man remain young and strong? 5 4 3 2 1

C. Why did no one ever grow old or ugly in the land of the Aesir? 5 4 3 2 1

D. How might the selection above best be classified?

fairy tale  myth
legend  tall tale
fiction  folk tale  5 4 3 2 1

II. Intense storms occur frequently in Antarctica, with winds up to 200 miles an hour and temperatures dropping to 100 degrees below zero. Scientists believe that millions of years ago, it was an entirely different continent. There is evidence which indicates that pine tree forests and jungles of tree ferns once thrived in a warm climate.

A. Which of the words below is least related to Antarctica? Explain your choice.

ice  green
storm  cold
wind  snow  5 4 3 2 1

B. What would happen to the islands of Hawaii if an ice sheet formed there? 5 4 3 2 1

C. Why do you suppose an ice sheet formed in Antarctica? 5 4 3 2 1

D. How could tree ferns grow in Antarctica? 5 4 3 2 1

III. Australia, the island continent, has many unusual animals. The platypus is the most extraordinary of all Australian animals. It has a bill like a duck and fur like a beaver. Even though the platypus is a mammal, it lays eggs like a bird.

A. Are there animals which might be considered unusual on continents other than Australia? 5 4 3 2 1
B. If a platypus were moved to the continent of North America, what problems might he encounter? 5 4 3 2 1

C. Why is the platypus considered to be Australia's most unusual animal? 5 4 3 2 1

D. How did Australia come to have more unusual animals than are found in all the rest of the world? 5 4 3 2 1

IV. A ship famous in American history, the U.S.S. Constitution, is docked in Boston Harbor. She won her nickname, "Old Ironsides," in a battle against the British ship in 1812. The British shots bounced off the Constitution's thick oak sides. The famous ship is now a floating museum where visitors may tour and relive the excitement of America's past.

A. How does Boston now have a floating museum? 5 4 3 2 1

B. Would a flying museum be as likely as the floating museum described in the selection? Why? 5 4 3 2 1

C. Do any modern ships repel enemy shells in the same way British shots bounced off the Constitution? 5 4 3 2 1

D. If the Constitution had not earned its nickname, "Old Ironsides," what might have happened? 5 4 3 2 1

V. On a solid flat-topped rock that rises 357 feet above the plains in New Mexico is located one of the strangest cities in the world. The sides of the rock are almost straight up and down. By digging finger holds up the slanting sides of these cliffs, and by clearing away loose stones from narrow ledges, ladderlike trails to the top have been made. For hundreds of years Indian men, women, and children made this sky city their home. These pueblos may have been the very first apartments used in America.

A. If New Mexico's rainfall for one year had been unusually heavy, how might this have influenced the Indian pueblo dwellers? 5 4 3 2 1

B. How did the Indians on the plains of New Mexico reach their apartment-like homes? 5 4 3 2 1

C. Why do you suppose the Indians of New Mexico built a city on a rock? 5 4 3 2 1

D. How did pueblos compare with the types of homes built by other Indians? 5 4 3 2 1
VI. Baseball in its very early days was different from the game today. At one time, four-foot-high poles were used as bases. A runner could be put out by being hit with a thrown baseball as he attempted to reach a base. The earliest bats looked like paddles and sticks and branches were sometimes used for hitting. For a number of years, gloves were not used, even by the catchers. Players felt that gloves were for sissies.

A. Baseball could be classified with which games below? Explain your choice.

<table>
<thead>
<tr>
<th>tennis</th>
<th>swimming</th>
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<tbody>
<tr>
<td>track</td>
<td>football</td>
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<tr>
<td>horse-racing</td>
<td>golf</td>
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B. Do you suppose that early-day football was different from the game today? Why or why not?

C. How was early-day baseball different from the game today?

D. What do you think the game of baseball will be like if it is played one hundred years from now?

VII. Five miles out in the Atlantic Ocean, off the eastern shore of Virginia, lies a tiny wind-rippled island, Assateague. Assateague is left to wild things—wild ponies and birds. The island is a wildlife refuge except for Pony Penning Day, when the strong men of Chincoteague, a neighboring island, turn cowboy and round up the wild ponies. It is the oldest roundup in America! At exactly low tide a signal is given and the wild herds are driven into the sea and made to swim across to Chincoteague. Chincoteague ponies, captured while they are still colts make gentle mounts. The colts are sold and the mares and stallions are driven back to Assateague for another year of freedom.

A. How would the life of the wild ponies on Assateague compare with that of the wild ponies of the west?

B. How do you suppose that ponies came to be on the island of Assateague?

C. Describe America's oldest annual roundup.

D. What might happen if man were to attempt to settle on the island of Assateague?
VIII. A shipwrecked sailor or a flier downed in shark-filled water may open a small package on his life vest and unfold a plastic bag. He will fill it with sea water and get into it. He then blows up air chambers in the bag which keep him afloat.

A. Do you suppose that John Paul Jones and his men used the protection against sharks described in the selection? Explain your answer.

B. What may a shipwrecked sailor or flier now do when he is downed in shark-filled water?

C. Why does the shipwrecked man get into the plastic bag?

D. The plastic bag in this selection can be grouped with which of the items below? Why?

balloon
chemical gun
knife
pillow

IX. For more than a thousand years, the reports of something living beneath the surface of Loch Ness have been heard in Scotland. A few years ago, a photographer took motion pictures of an object moving through the lake waters. Photography experts of the British government decided that the object in the film was 92 feet long, at least 6 feet wide, and 5 feet high. The experts also said that it was moving at 10 miles an hour.

A. If you were hired to find out if there is something unusual living beneath Loch Ness, what action would you take?

B. Why are some people wondering whether the story could be true about the Loch Ness monster?

C. Can you tell of a similar sighting of something mysterious that scientists cannot explain?

D. If you were going to classify the selection, which type of literature would best describe it?
X. The Indians of North America had a few simple musical instruments before the white men came. Some Indians made flutes out of hollow reeds with several holes for the fingers. Whistles made of wood, clay, or bone were very common. Of all Indian whistles, the most important was the war whistle. Usually this was made of the bone of a deer's leg and was brightly decorated. Ordinarily, it could play only two different notes. The chief used it in battle to give signals to his men.

A. If an Indian chief were to have lost his war whistle during a battle, what might have happened? 5 4 3 2 1

B. Why was the war whistle the most important of all Indian whistles? 5 4 3 2 1

C. What application does modern man make of sound signals similar to the Indian war whistle? 5 4 3 2 1

D. The Indian war whistle might be classified with which musical instruments below? Explain your answer.

- drum
- clarinet
- flute
- trombone 5 4 3 2 1
QUESTION RATING JURY

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Fay, Dr. Leo. Professor of Elementary Education, Past President of the International Reading Association, Reading Specialist, Indiana University, Bloomington, Indiana.

McMillon, Miss Loraine. Elementary Consultant, Reading Specialist, Fort Worth Independent School District, Fort Worth, Texas.

Malone, Dr. Alma. Associate Professor of Education, Reading Specialist, Houston Baptist College, Houston, Texas.

Martin, Dr. Bill. Assistant Professor of Education, Coordinator of Multimedia Instructional Resources, North Texas State University, Denton, Texas.

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QUESTION ENCOURAGEMENT APPRAISAL

Teacher ____________________ Subject__________________ Date________________

Topic or Activity ____________________ Time ____________ to ____________

1. More than meets criteria 3. Does not meet criteria
2. Meets criteria 4. No evidence

THE TEACHER:

1. Gives students opportunity to ask questions

2. Entertains seriously the questions and ideas that students present

3. Allows the students time to explore an idea before going on to another student's questions

4. Encourages students to use questions that require higher order thinking

5. Assumes the role of active learner as well as teacher

6. Avoids dogmatic answers that halt thinking and exploration

7. Encourages each student to accept as much responsibility for his own intellectual development as he is able to at his level of maturity

8. Allows students to explore something which has aroused their curiosity

9. Gives students time to do research

10. Gives students access to appropriate research materials

11. Gives students guidance in using research materials when assistance is required

12. Gives students an opportunity to share their discoveries orally and/or in writing

TOTAL
### ANALYSIS OF TEACHER- AND STUDENT-INITIATED QUESTIONS

#### Appendix G

**Source**

**Question**

**Question Designee**
- Entire Class
- Small Group
- Student
- Teacher

**Type of Question**
- Memory Skills
- Composite Skills
- Interpretation-Inference Skills
- Predicting Consequences

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<th>Source</th>
<th>Question</th>
<th>Question Designee</th>
<th>Type of Question</th>
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**Teacher**

**Subject**

**Date**

**Time**

**To**

**Teacher**

**Subject**

**Date**

**Time**

**To**
A GUIDE TO USING QUESTIONS

IN

READING INSTRUCTION
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WHAT IS CURiosity?

Curiosity as it will be used in this study, will mean

Intrinsic motivation which results from strong needs or goals, a deep desire to find something out. It is a motive which directs, channels, and sustains purposive problem-solving behavior.

An elementary school child will be said to exhibit curious behavior when he

Expresses an intrinsically motivated desire to know more and more about himself and/or his environment. This strong desire to find something out finds expression in varied overt behavior. He may exhibit a puzzled expression when confronted with novel or dissonant stimuli in the environment and persist in observing and manipulating them or asking questions, listening, and reading in order to satisfy his quest to know.
WHEN IS A STUDENT CURIOUS?

Some of the behavior characteristic of a curious student is evidenced when the student

1. Displays purposeful physical activity
   A. Postures himself so as to be alert and ready for the task at hand
   B. Expresses varied facial expressions (e.g., puzzled, quiz-zical, amused)
   C. Moves toward objects or ideas that are new, mysterious, or unusual and observes them and/or manipulates them

2. Engages in purposeful receptive mental activity
   A. Listens
   B. Reads
   C. Researches to find the information he seeks
   D. Works with puzzles, problems, and other mental exercises

3. Engages in purposeful expressive mental activity
   A. Asks questions
   B. Expresses ideas orally
   C. Presents written ideas

The curious student seeks to know more and more about himself and/or his environment, because he himself desires to know more. This motive or desire to know directs his behavior toward inquiry.
HOW CAN QUESTIONS BE CATEGORIZED?

Instructional questions can be classified into four categories.

These categories are described below.

Category 1. Developing Memory Skills. The lowest form of cognitive thinking deals with memorization. Most children can learn to parrot back short one-answer questions. Questions of this type are of the following nature: "Who was the first President?"; "What is the speed of sound?"; "Who discovered America?" On the basis of research it could be safely predicted that nearly 80 percent of the questions asked in the classroom have been in this category. Such questions require sheer recall, convergent responses, and no equivocation. They simply focus a child's mind upon stating, describing, reporting, or defining; they only point to cognitive retention.

Category 2. Developing Composite Skills. When the child is asked to classify, compare, contrast, or substitute his previously acquired knowledge, then he is using a higher form of cognitive skill. He is "grouping" information so that it can be "isolated" into an appropriate answer. Questions which extend the topic under consideration are of the following structures: "What is a property of two of the following four examples that is not a property of the other two?" (Helium; hydrochloric acid; nitrogen, nitric acid); "What is similar in the works of the following artists but two of whom have gone beyond realism. Who are these two?" (Caravaggio, Dali, Wyeth, Picasso). Questions of this type call for the child to check categories of knowledge he now has, and further require that he regroup some skills and extend his ideas as he bridges gaps in his thinking processes.

Category 3. Interpretation and Inference Making Skills. The skill involved here is of high level since the child must apply some treatment to the subject under consideration. He is asked to engage in a transformation of information from one situation to another. For example, "What position might Abraham Lincoln take with regard to Civil Rights Issues if he were living today?"; "If we go to the moon, what might be the legal problems in first order to be considered before colonizing the planet?" Noteworthy here is the fact that a type of reasoning is called for which actually has no right response. The less evaluative or exact an answer sought, the better the type of response from the reasonableness of the judgment made as compared with the background of experience and the level of development of the respondent. Teachers should become most cognizant of the fact that very rarely are questions of this type flowing throughout the daily classroom lessons.
Category 4. Predicting Consequences. In order to safely make judgments for predicting consequences, the learner must seek to determine sincerity or bias of a speaker or writer, analyze and synthesize information so valid reasoning can be done and outcomes expected can be more logically forecast. With this type question the pupil is given an independent variable, a situation or idea, and is then asked to predict the dependent variable or expected consequence. Questions for this category might be of the following structures: "What might the United States be like if the Japanese had conquered the World during World War II?"; "If light produces change in plants, then what are some possible effects of lack of light upon man?"; "If 'business flying' is increasing tremendously in the United States, then what effect will it have upon company size and location?"; "If DDT (Dichloro-Diphenyl-Trichloroethane) is an active compound for destroying insects, then what must be done chemically to prevent it from harming man?"

If children are asked to use "background knowledge" only, then the teacher may be somewhat limited in the amount of thinking that can be required of selected individuals. However, when an accurate, true independent variable is provided the pupil, he can draw on the past, and fresh data given, and make judgments accordingly. The level of cognition of the pupil is lifted when he repeats the "if" part of the question and then supplies the "then" portion. The response involves weighing ideas against each other, trying out new interpretations of old experiences, and considering evidences for and against a conclusion.

Category 3 and Category 4 questions will be used more extensively to develop students' reading-thinking skills during reading instruction. These types of questions are considered to be most effective in encouraging a student's curiosity.
WHAT ARE SOME METHODS OF QUESTIONING?

The questions to accompany basal reader selections provided in Appendix E will be used with students before the reading of basal reader selections and following the reading of the selections.

Samples of types of reading materials and appropriate questions are given in Appendix D. Questioning to be used with such materials as supplementary readers; history, geography, science books; and recreational reading such as children's newspapers, magazines, and library books is to be left to the discretion of the classroom teacher, but questions that are most effective in promoting curiosity should be used more extensively.

 Whenever the teacher feels that a student is behaving as if he is curious while he is reading, the teacher should ask that student a question.
HOW CAN STUDENT QUESTIONING BE ENCOURAGED?

Student-initiated questions will be encouraged. Lessons will be taught with the purpose of helping students improve their questioning skills. The selections given in Appendix D can be used by students for practicing their development of questions. Afterward, students can be given an opportunity to see the samples of appropriate questions that are also presented in the section. Students should learn that types of questions such as these are to be preferred, because they uncover new ideas and lead to more helpful and/or interesting information.

Students should have opportunities to ask questions. The "Analysis of Teacher- and Student-Initiated Questions," presented as Appendix C, will be used as a classroom observational instrument to determine the types of questions being used by students and teachers and the proportion of student- and teacher-initiated questions.

Students should be allowed to explore something which has aroused their curiosity, even if it is not in the textbook or course of study. Research materials should be available to students, they should have time to use them, and guidance in using them when assistance is required. There should be opportunities for students to share their discoveries orally and/or in writing. A form will be provided so that each student can keep a record of what he discovers and tell how he found it. A copy of this form is given as Appendix A.

The teacher should show acceptance of and respect for student thinking and listen to student questions and responses. Students should be allowed enough time to explore an idea before going on to another
student's questions. Authoritarian answers should be avoided, because they limit thinking and exploration. Student initiative should be encouraged. The teacher should assume the role of active learner as well as that of teacher.

An observational instrument, "Question Encouragement Appraisal," will serve as a check to determine the extent to which student questioning is being encouraged in a classroom. A copy of this instrument is found in Appendix B.
WHAT AND HOW I FOUND OUT

It is interesting to keep a simple record of some of the things we find out and how they are found out. For the next few weeks you will be asked to keep such a record.

You should write down only the most exciting things you discover. A brief sentence or two is enough explanation. Note the date and how you found out.

There are many ways to find out interesting things. You may read and find out in a book, magazine, or newspaper. You may ask someone and find out. Someone may tell you. You may discover something through television, radio, a filmstrip, a record, or a tape recording. See how many ways you find out the things that you know by keeping a record of the most interesting things you find out and how you find them out.

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<tr>
<th>Date</th>
<th>What I Found Out</th>
<th>How I Found Out</th>
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<tr>
<td>2</td>
<td>Meets criteria</td>
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**THE TEACHER:**

1. Gives students opportunity to ask questions 1 2 3 4

2. Entertains seriously the questions and ideas that students present 1 2 3 4

3. Allows the students time to explore an idea before going on to another student's questions 1 2 3 4

4. Encourages students to use questions that require higher order thinking 1 2 3 4

5. Assumes the role of active learner as well as teacher 1 2 3 4

6. Avoids dogmatic answers that halt thinking and exploration 1 2 3 4

7. Encourages each student to accept as much responsibility for his own intellectual development as he is able to at his level of maturity 1 2 3 4

8. Allows students to explore something which has aroused their curiosity 1 2 3 4

9. Gives students time to do research 1 2 3 4

10. Gives students access to appropriate research materials 1 2 3 4

11. Gives students guidance in using research materials when assistance is required 1 2 3 4

12. Gives students an opportunity to share their discoveries orally and/or in writing 1 2 3 4

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**TOTAL**
## ANALYSIS OF TEACHER- AND STUDENT-INITIATED QUESTIONS

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<th>SOURCE</th>
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Teacher ____________________________ Subject ____________________________ Date ____________________________

Topic or Activity ____________________________ Time ___________ To ___________
Appendix D

SAMPLE SELECTIONS AND QUESTIONS

I. Long, long ago, in the northern lands of the midnight sun, people believed that a race of gods, or Aesir, as they were called, ruled the earth. A beautiful lady named Idun kept the most precious treasure of the Aesir, the apples from a magic tree. The best thing about these apples was that whoever tasted one, be he ever so old, grew young and strong again. Every morning the Aesir came to Idun to be refreshed and made over by a bite of her precious fruit. That is why in the land of the Aesir no one ever became old or ugly.

A. How were the gods of Aesir like modern-day man?
B. What might be the consequences of a discovery of something to help man remain young and strong?

II. Intense storms occur frequently in Antarctica, with winds up to 200 miles an hour and temperatures dropping to 100 degrees below zero. Scientists believe that millions of years ago, it was an entirely different continent. There is evidence which indicates that pine tree forests and jungles of tree ferns once thrived in a warm climate.

A. What would happen to the islands of Hawaii if an ice sheet formed there?
B. Why do you suppose an ice sheet formed in Antarctica?

III. Australia, the island continent, has many unusual animals. The platypus is the most extraordinary of all Australian animals. It has a bill like a duck and fur like a beaver. Even though the platypus is a mammal, it lays eggs like a bird!

A. If a platypus were moved to the continent of North America, what problems might he encounter?
B. How did Australia come to have more unusual animals than are found in all the rest of the world?

IV. A ship famous in American history, the U.S.S. Constitution, is docked in Boston Harbor. She won her nickname, "Old Ironsides," in a battle against the British ship in 1812. The British shots bounced off the Constitution's thick oak sides. The famous ship is now a floating museum where visitors may tour and relive the excitement of America's past.

A. Do any modern ships repel enemy shells in the same way British shots bounced off the Constitution?
B. If the Constitution had not earned its nickname, "Old Ironsides," what might have happened?

V. On a solid flat-topped rock that rises 357 feet above the plains in New Mexico is located one of the strangest cities in the world. The sides of the rock are almost straight up and down. By digging finger holds up the slanting sides of these cliffs, and by clearing away loose stones from narrow ledges, ladderlike trails to the top have been made. For hundreds of years Indian men, women, and children made this sky city their home. These pueblos may have been the very first apartments used in America.

A. If New Mexico's rainfall for one year had been unusually heavy, how might this have influenced the Indian pueblo dwellers?

B. Why do you suppose the Indians of New Mexico built a city on a rock?

VI. Baseball in its very early days was different from the game today. At one time, four-foot-high poles were used as bases. A runner could be put out by being hit with a thrown baseball as he attempted to reach a base. The earliest bats looked like paddles and sticks and branches were sometimes used for hitting. For a number of years, gloves were not used, even by the catchers. Players felt that gloves were for sissies.

A. Do you suppose that early-day football was different from the game today? Why or why not?

B. What do you think the game of baseball will be like if it is played one hundred years from now?

VII. Five miles out in the Atlantic Ocean, off the eastern shore of Virginia, lies a tiny wind-rippled island, Assateague. Assateague is left to wild things—wild ponies and birds. The island is a wildlife refuge except for Pony Penning Day, when the strong men of Chincoteague, a neighboring island, turn cowboy and round up the wild ponies. It is the oldest roundup in America! At exactly low tide a signal is given and the wild herds are driven into the sea and made to swim across to Chincoteague. Chincoteague ponies, captured while they are still colts make gentle mounts. The colts are sold and the mares and stallions are driven back to Assateague for another year of freedom.

A. How do you suppose that ponies came to be on the island of Assateague?

B. What might happen if man were to attempt to settle on the island of Assateague?
VIII. A shipwrecked sailor or a flier downed in shark-filled water may open a small package on his life vest and unfold a plastic bag. He will fill it with sea water and get into it. He then blows up air chambers in the bag which keep him afloat.

A. Do you suppose that John Paul Jones and his men used the protection against sharks described in the selection? Explain your answer.

B. Why does the shipwrecked man get into the plastic bag?

IX. For more than a thousand years, the reports of something living beneath the surface of Loch Ness have been heard in Scotland. A few years ago, a photographer took motion pictures of an object moving through the lake waters. Photography experts of the British government decided that the object in the film was 92 feet long, at least 6 feet wide, and 5 feet high. The experts also said that it was moving at 10 miles an hour.

A. If you were hired to find out if there is something unusual living beneath Loch Ness, what action would you take?

B. Can you tell of a similar sighting of something mysterious that scientists cannot explain?

X. The Indians of North America had a few simple musical instruments before the white men came. Some Indians made flutes out of hollow reeds with several holes for the fingers. Whistles made of wood, clay, or bone were very common. Of all Indian whistles, the most important was the war whistle. Usually this was made of the bone of a deer's leg and was brightly decorated. Ordinarily, it could play only two different notes. The chief used it in battle to give signals to his men.

A. If an Indian chief were to have lost his war whistle during a battle, what might have happened?

B. What application does modern man make of sound signals similar to the Indian war whistle?
QUESTIONS TO ACCOMPANY BASAL READER SELECTIONS

Unit IV. Round About America

A. "Putting Into," pages 175-187

1. Pre-reading questions

   a. If you were a member of a migrant worker's family, what are some of the things you might wish for?

   b. If a father who is a migratory worker took a job that would last for several months, how might this affect his family?

2. Questions to follow reading of story

   a. How might a migrant worker's family feel in a large city like New York?

   b. If a migratory worker's family lived in one town for a year or longer, what might happen to the family?

B. "Saving the 559," pages 189-198

1. Pre-reading questions

   a. Do you think Pierre and Marie would enjoy attending our school? Why?

   b. If the School on Wheels should no longer come to Pierre and Marie, how might this influence them?

2. Questions to follow reading of story

   a. How else might Pierre have warned the train of its danger?

   b. What might have happened if Pierre and Marie had not decided to go out and see if the storm did any damage?

C. "Homemade Fiddle," Pages 199-209

1. Pre-reading questions

   a. Do we have any kind of entertainment that might be similar to a fiddling contest?

   b. If you were the boy Irby in the picture on page 199, how might you feel?
2. Questions to follow reading of story

a. If Irby came to the Fort Worth Fat Stock Show, could he play his homemade fiddle?

b. If Fiddler and the audience had not liked Irby’s tune, what might have happened?

D. "Tara's Burro," pages 210-222

1. Pre-reading questions

a. Would the houses pictured on page 210 serve as good places in which families in the Fort Worth area might live?

b. If a very heavy rain fell in the area pictured on pages 210 and 211, what might happen?

2. Questions to follow reading of story

a. Do you think your mother would react as Tara's did if you said you were going on a trip? Why?

b. If the workers on El Rancho had known how to train a stubborn burro, how might the story have been different?

E. "Gloucester Boy," pages 224-236

1. Pre-reading questions

a. Do you think the schooner pictured on page 224 could sail on our lakes and rivers?

b. When the schooner pictured on page 224 reached the sea, how would it behave if a big storm came up?

2. Questions to follow reading of story

a. Do any boys in this part of the country (Southwestern states, Texas) get to help men as they earn their living, as Manuel went deep-sea fishing with his Uncle Joe and the crew of men? Give examples.

b. If Manuel had not had lessons in lifesaving and been so brave, what might have happened to Tony?