RELATIONSHIPS BETWEEN INQUIRY BEHAVIOUR AND INTERMEDIATE CHILDREN'S READING AND LISTENING SKILLS

by

DOROTHY CHARMIAN ANNE BRIGGS

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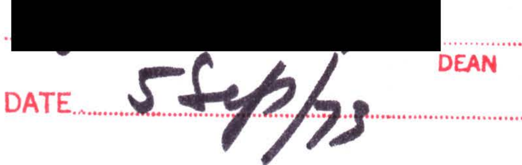

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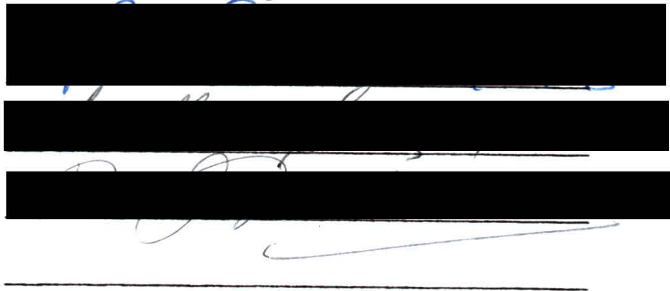

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Supervisor: Dr. P. O. Evanechko

ABSTRACT

The purpose of this study was to determine the effect of inquiry training upon the reading and listening skill development of grade five children.

In the theoretical framework, it was postulated that the inquiry process begins with the perception of an unusual stimulus which induces conceptual conflict, and that conflict reduction through language reception activities results in new learning. Influences affecting initial perception of stimuli were described in relation to cultural heritage, capacity for curiosity, mind set, and level of learning. Inquiry through language was discussed in terms of both objective and subjective dimensions. The objective dimension posited convergent, propositional, logical thought processes. The subjective dimension posited divergent, suppositional, intuitive thought processes. These processes were described in relation to the Barrett-Clymer (1968) taxonomy: literal comprehension, reorganization, inferential comprehension, evaluation, and appreciation of oral and written material. The postulated relationship between inquiry behaviour and reading and listening skill development was also defined.

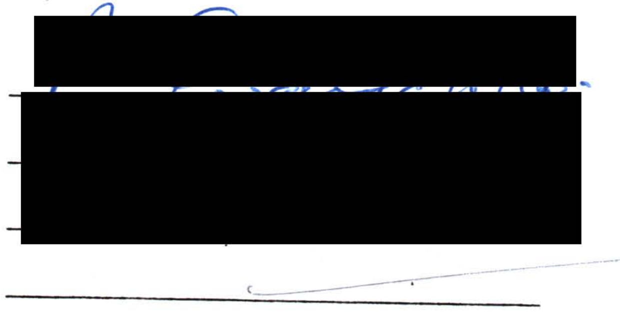
The following procedures were implemented during the treatment in an attempt to increase inquiry behaviour: a) introduction of unusual stimuli to induce conceptual conflict, b) introduction of epistemic, critical, and suppositional questioning in games, role play, creative drama, discussion, and oral or silent reading, for the purpose of conflict reduction; and c) encouragement of individual approaches,

methods, and responses to given tasks. An inductive/deductive curriculum design was followed, and various strategies were tested in a pilot study. Evaluation of the pilot study indicated that children could learn and enjoy inquiry strategies in many contexts.

A sample of 135 children in six classes was randomly selected and assigned to one of two groups: treatment or control, three classes per group. Inquiry training was undertaken by the treatment group in March and April, 1973. Reading and listening achievement tests were administered to both groups in February, April, and June, 1973. Since homogeneity of variance could not be assumed, due to observed differences between the two groups in pretest achievement and socio-economic status, the data were analyzed by analysis of covariance using pretest achievement and socioeconomic status as covariates. Results were interpreted as partially supporting the hypothesis that inquiry training affects both listening and reading skill development; however, it should be noted that significant differences were not consistent across all subtests. Test findings also indicated that significant differences inconsistent in degree and direction were present within each group, and that substantial positive relationships existed between reading and listening subskills.

From the analyses of the results it was concluded that inquiry training tends to affect the least complex listening behaviours first; and when administered over a short period of time, it appears to have a restricting effect on reading achievement. It was recommended that further research was needed to devise an adequate instrument to measure the effect of inquiry; to devise reading materials that use inquiry strategies as a basis for developing comprehension; to determine the

relationship of socioeconomic status and intelligence to inquiry behaviour; to ascertain the effect of long-term, skill-specific training on reading and listening skill development, and to determine the effect that teachers skilled in questioning strategies have upon children's inquiry practices.



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CHAPTER I

THE PROBLEM

I INTRODUCTION

"Children are naturally curious; they want to find out" (Doll, 1964, p. 64). During their preschool years, their curiosity has led them to explore their environment and to learn to communicate with their families and peers. When they come to school curious and eager to learn, they have, to a considerable extent, mastered their native language (Bromwich, 1972). Their speech patterns, based on those of significant adults, have been influenced by the opportunities they have had to gather experience, by the variety of manipulative materials they have used for discrimination or comparison, and by the freedom they have had to ask questions and to receive answers (Frost, 1967). By the age of five years, most children understand the concepts of <u>question</u> and <u>answer</u> and are able to use both fluently (Halliday, 1969).

Although children may have skill in the use of language and comprehension of the concept of questioning, asking meaningful thought-provoking questions has not been stressed in the schools of North America for the last fifty years (Gall, 1970). In his review of the use of questions in teaching, Gall (1970) cited these findings: a) Of the total number of questions observed in a grade one classroom, children asked only 3.75%. b) Grade 7 children asked 17% of the observed questions, most of which were procedural, not substantive. c) The teachers' questions, though extensive in quantity, were generally low in quality; that

is, there were more literal comprehension questions than questions requiring the cognitive processes of inference, evaluation, or appreciation. Gall (1970, p. 716) also stated that of the total number of teacher questions observed, 60% were factual, 20% were procedural, and only 20% thought-provoking.

The lack of quality in teachers' question-asking behaviour has been severely criticized by Flanders (1970) who maintained that teachers frequently use questioning as a means of humiliating or subordinating students. He recommended that teachers develop skill in forming and sequencing questions; and he emphasized that teachers could facilitate the development of logical thinking and efficient inquiry by training students to differentiate categories and to establish relationships. Other articles and studies published about teachers' questioning reveal a similar concern for the cognitive quality of questions asked (Aschner, 1961; Gall, 1970; Galloway & Mickelson, in press; Lanier & Davis, 1972; Mangione, 1972; Sanders, 1966; Wellington & Wellington, 1962). Zahorik (1971), however, expressed concern that stress on the need for upgrading the quality of teachers' questions is emphasizing the tradition of the teacher as inquirer and reinforcing the idea that pupil inquiry is inappropriate, a tradition which is inconsistent with present goals of self-directed learning.

Blank and Covington (1965) stated that there was a widespread deficiency in question-asking among children in school, possibly as a result of large class size, lack of question-asking practice, or lack of training in question-asking. They found an absence of both questioning skill and a questioning mind set.

Suchman (1960) felt that inquiry could not be learned as an isolated skill; and he maintained that although training increases the number of valid questions children ask in a test situation, it does not significantly enhance the quality of the questions, nor does it facilitate grasp of concepts. In 1962, he stated that the real test of inquiry training would be whether the child would use the skills he had developed in several content fields. He suggested that if inquiry is a mode of behaviour which could be practised and strengthened through the deliberate moulding of specific techniques and strategies, then it should be readily applicable to various problem areas. The present study, however, is not concerned with the transfer of the techniques and skills of inquiry, but with the development of questioning strategies by elementary school children in the language arts context, and in discovering whether or not the learning of these strategies affects language skills.

II. STATEMENT OF THE PROBLEM

Little is known about the training of students in question-asking skills. Cronbach (1966) stated that research and training in inquiry methods have been limited by continued failure to make the concept operational; and that focussing on specific questioning skills in various classes might provide the clarity needed for implementing effective inquiry methods. Glaser (1966) advised that inquiry behaviour may be subject-matter-specific; although some aspects may be held in common, there is much specific variance. Other researchers, however, have found that inquiry or question-asking is a type of problem-solving behaviour and, therefore, transfers effectively (Blank & Covington, 1965; Cross,

1970). Cross (1970) also stated that support for inquiry as a worthwhile learning strategy rests mainly on a basis of positive opinion; many books and articles are available but research is scanty. Glaser (1966) expressed a similar viewpoint:

> ... we know so little about it [teaching for discovery], one can say anything and enjoy his own speculations without the constraints of knowledge (p. 23).

Since 1970, published research has continued to be scarce. However, educators still assume that inquiry training and discovery techniques are desirable learning strategies, particularly in problem-solving situations (Morine & Morine, 1973).

The effect of question-asking on listening and reading is assumed to be considerable. Smith, Goodman, and Meredith (1970) suggested that reading is an active process in which the child depends upon his experience to infer or guess the word he is reading. Smith (1971) stated that reading is a trial-and-error process of hypothesis testing behaviour. In school, learners gain most of their knowledge through the use of language (Bruner, 1966). Inquiry methods or strategies to gain new knowledge are an acknowledged route to the learner's ultimate goal (Wittrock, 1966). However, the hypothesis that inquiry skills affect language learning has not been tested. Suchman (1962) and Blank and Covington (1965) found that training children to develop specific questioning behaviours resulted in their asking more questions than did children not trained in these behaviours. Wittrock (1966) insisted, however, that in order to evaluate learning by discovery, empirical data on its consequences must be obtained. The present study, therefore, represented an attempt to obtain empirical data by measuring the student's

achievement before and after inquiry training.

III. PURPOSE OF THE STUDY

This study attempted to evaluate the effect of inquiry training on listening and reading. The children were provided with experiences and opportunities which encouraged question-asking in a variety of language contexts for the purpose of determining whether or not they would show greater gains in reading and listening than children who received no training in question-asking. The study is generally exploratory in nature and diverse in approach.

IV. DEFINITION OF TERMS

In this study, _inquiry_ indicates the process by which a learner discovers new facts, concepts, or principles through posing a question or series of questions. The questions may be for the purpose of searching for possible solutions to a problem, of evaluating or verifying information (Strasser, 1971), of intuiting new ideas, or of finding new perspectives (Burkhart & Neil, 1968).

Inquiry training refers to the teaching of specific questioning strategies for use in decoding both oral and written language, for gaining specific facts and information, for extending critical awareness, and for expanding awareness of other points-of-view.

Question-asking (in question form or not) is described as a thought-producing activity resulting in a search for facts, concepts, or principles. Questions may indicate uncertainty, incomprehension, or ignorance. They may be directed towards print or non-print media, another person, or the questioner himself.

Learning by discovery is a consequence of the inquiry process. The learner, presented with a set of data, is required to ask questions about it for the purpose of determining relationships, developing concepts, deriving principles, or attaining new perspectives. By searching for answers to his own questions, he discovers the new knowledge he seeks. The modes of discovery used in this study included the inductive, the semideductive, and the transductive (Morine & Morine, 1973). Inductive discovery involves collecting and reordering data to derive new principles, concepts, or classifications. Semideductive discovery elicits rules or principles through observation of specific data. Transductive discovery involves nonlogical, divergent, and imaginative thinking leading to artistic creation (Morine & Morine, 1973).

Terms used in the theoretical framework for the study are defined in Chapter II.

V. HYPOTHESES AND ASSUMPTIONS

The major hypothesis of the study dealt with the effect of inquiry training upon listening and reading. Because of the lack of corroborating research data, a general hypothesis was assumed, and was stated in the null form: As a result of inquiry training, there will be no significant differences between the reading and listening test scores of the treatment group and the control group.

Specific hypotheses concerning the effect of inquiry training upon a defined set of reading and listening skills were also stated in the null form.

1. There will be no significant differences between the mean scores of the control group and the mean scores of the treatment group on the pretest, the posttest, and the retention test in:

    a. basic reading vocabulary,
    b. ability to read for information,
    c. ability to read for relationships,
    d. ability to read for interpretation,
    e. ability to read for appreciation,
    f. literal reading comprehension,
    g. creative and imaginative reasoning (reading),
    h. general reading comprehension,
    i. literal listening comprehension,
    j. listening for interpretation,
    k. listening for appreciation and evaluation of material, and
    l. general listening comprehension.

2. There will be no significant differences between the mean scores of the pretest, the posttest, and the retention test for the control group on the preceding measures.

3. There will be no significant differences between the mean scores of the pretest, the posttest, and the retention test for the treatment group on the preceding measures.

The assumptions of the study included:

1. Curiosity is characteristic of elementary school children (Doll, 1964).

2. Question-asking, leading to the discovery of new ideas, is self-reinforcing and self-motivating (Bruner, 1960).

3. Inquiry behaviour is a complex of behaviours which can be identified for instructional purposes (Berlyne, 1965; Bruner, 1960, 1961, 1966; Mosher & Hornsby, 1966; Suchman, 1960, 1962, 1963).

VI. LIMITATIONS OF THE STUDY

The training period of five weeks may have been too brief to permit inquiry strategies to develop sufficiently in affecting reading and listening. Total lesson time was sixteen hours, forty minutes (25 forty-minute lessons). During his inquiry training unit, Suchman (1960) spent fifteen hourly sessions with the children. Blank and Covington (1965) allotted six and three-quarter hours divided into nine sessions of forty-five minutes each. Both these studies were concerned with the quantity and type of questions, and not specifically with their effect.

The instruments chosen measure only selected skills. Whether or not these skills were the only ones affected by inquiry training is not known. No specific instrument has been designed to measure precisely the effect of inquiry training. The instruments selected, however, do measure those skills thought most likely to be affected by question-asking behaviours: general comprehension of spoken or written material, and critical and appreciative listening and reading (Allen, 1969; Betts, 1961; Carner, 1963; Russell, 1963; Spache, 1963; Stauffer, 1960).

The subjects in this study represent only grade five students in an exurban area; they do not represent the entire school population.

VII. ORGANIZATION OF THE STUDY

The study is organized into five chapters. The first chapter is the introduction and includes a statement of the problem, purpose of the study, definition of terms, hypotheses and assumptions, and limitations.

The second chapter contains the theoretical framework and review of literature and is divided into two main sections: a discussion of selected factors affecting the inquiry process, and a rationale for the development of the inquiry training procedures.

Chapter three describes the design of the study. It includes a discussion of the development of the inquiry strategies used, a report of the pilot study, and an examination of the sample, instrumentation, and procedures of the major study.

Chapter four presents the results of the study in relation to the hypotheses stated in the first chapter, and a discussion of the results.

The fifth chapter presents conclusions and implications for classroom teaching and future research.

The appendix provides additional data relevant to the study.

CHAPTER II

REVIEW OF THE LITERATURE

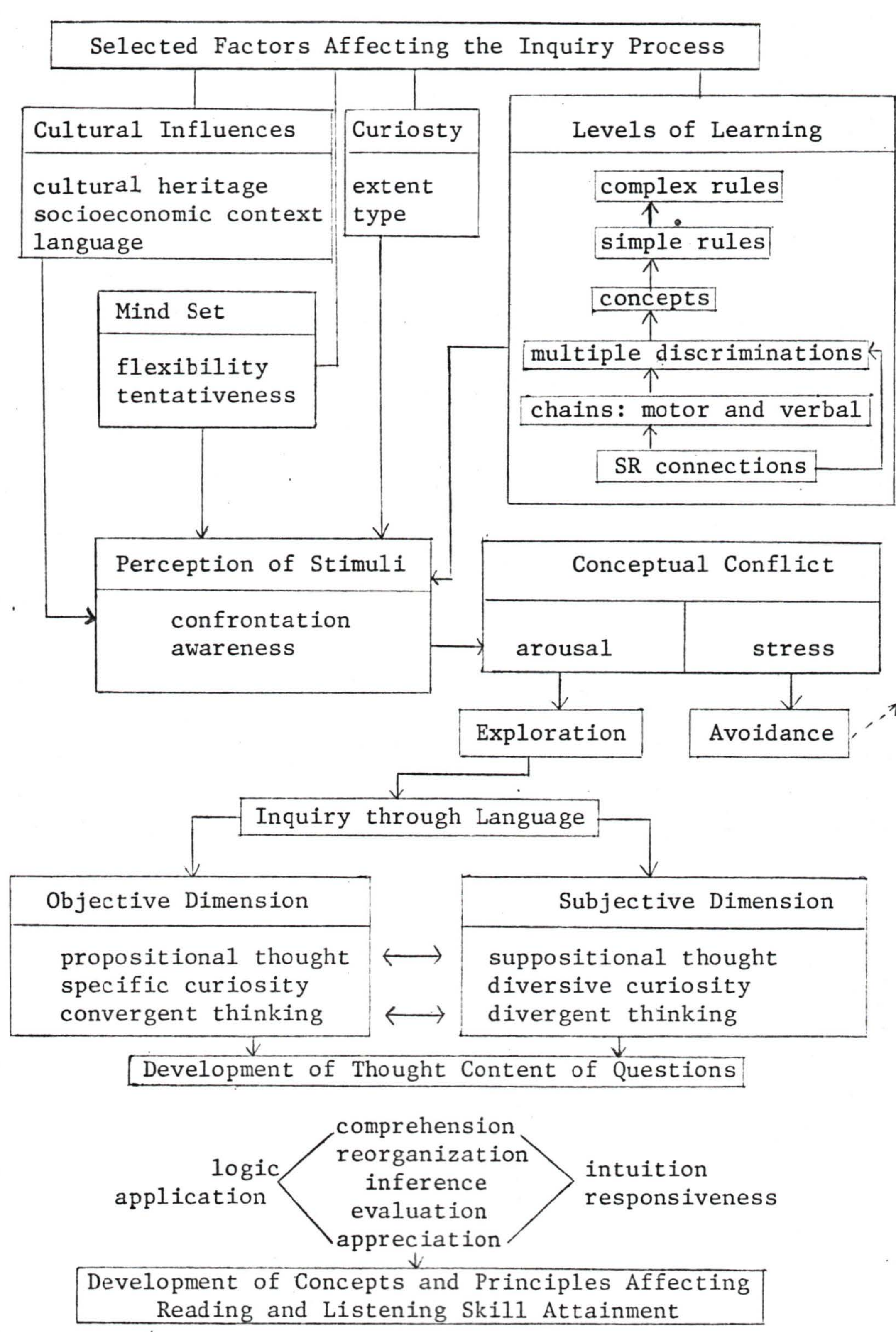
The first section of this review contains the theoretical framework for the study (Table 1) and includes a discussion of selected factors influencing the inquiry process. These factors include those which affect perception of the stimuli, the conceptual conflict resulting from the perception, the dimensions of inquiry used for the resolution of conceptual conflict, and the resulting hypothesized development of concepts and principles leading to increased skill in listening and reading. The second section of the review presents a rationale for the inquiry training procedures used during the treatment period.

I. A THEORETICAL FRAMEWORK FOR THE INQUIRY PROCESS

Inquiry begins when a learner perceives new or unusual stimuli in his environment (Suchman, 1962). It should be noted, however, that the individual's cognitive organization of his perceptions is largely dependent upon his cultural heritage, the extent of his curiosity, his habitual mind set, and his level of learning. Reaction to perceptions may result in stress, leading to avoidance and non-learning, or in arousal, leading to exploration and effective learning. The present study postulates that the learner uses language to examine stimuli. For the purpose of clarification this heuristic use of language, which encourages investigation by and discovery for the self, is discussed in terms of a subjective and an objective dimension. Interaction of these dimensions may

Table 1

A Model of the Inquiry Process



influence the thought content of the questions asked, which in turn, may affect the attainment of reading and listening skills.

Selected factors within this inquiry process are examined below.

Cultural Influences

Man is by nature curious and inquiring; when put into a new, strange environment, no matter how sterile or desolate, he seeks to learn what he can (Bruner, Olver, and Greenfield, 1966). In primitive societies, instruction of the child is direct, active, and concrete; he is shown what he needs to know in order to survive. He need not ask "how" or "why" because methods and reasons are self-evident. In the sophisticated, technological societies of North America, on the other hand, the child is told, not shown, what he needs to know. To understand relationships or to develop complex principles, he must ask "how" and "why". His view of the world can be expressed only in terms of the complex culture in which he lives. Bruner, _et al_. (1966) contended that " ... the ways of looking and thinking that characterize a culture ..." (p. 320) evolve over a very long period and are consequent upon the manner in which the culture has coped with its circumstances. It would seem, therefore, that his way of looking and thinking would predetermine the school child's mode of inquiry, and also that his mental outlook would depend to a considerable degree upon his understanding of his environment and upon his control of the language of that environment.

Inquiry behaviour may be influenced, not only by cultural heritage, but also by the immediate socioeconomic environment. Bernstein (1961) found that a significant correlation existed between the child's natural

curiosity and the mother's responses to his questions; a child whose questions were not answered informatively tended to ask fewer and fewer questions. Hess and Shipman (1965) also found that behaviour leading to language deprivation was learned, and was due to a lack of cognitive meaning in the mother-child relationship. Loban (1967) noted that children from the high socioeconomic strata, throughout their twelve years of schooling, used tentative and suppositional statements in their speech, suggesting a tolerance for ambiguity and a willingness to suspend judgement. Both qualities are necessary for an inquiring mind set. A learner who "knows" all the answers has no need to ask questions.

Whorf (1961) stated that the culture into which a man is born affects his world view, his way of looking at reality; and that reality, therefore, is differently perceived by cultures speaking different languages. The language of the culture shapes the ideas of its speakers, and analysis of the language patterns acquired by the speakers reveals their cognitive behaviour. The mode of inquiry used by a speaker would, therefore, be contingent, in part, upon the language patterns of his culture and his perceptions of reality.

The interaction of the child's cultural heritage, socioeconomic environment, and language acquisition considerably influences his perception of a discrepant event and his symbolic response to that perception. Within the bounds imposed by his culture, the child uses language to satisfy his particular needs, among them the need to inquire or to investigate his environment. Halliday (1969) identified the child's habit of question-asking in terms of his seeking, through language, both the facts and the explanations of facts that enable him to generalize

about his world. Sapir (1937) concluded that this heuristic function of language predetermined the way a child observes and interprets his view of reality.

In summary, the effects of culture on inquiry, to some extent, limit and predetermine the child's ability to inquire by imposing upon him certain conditions regulating his perception of stimuli. For example, a child in Victoria would not inquire about snow conditions with the same cultural knowledge as would an Eskimo child who perceives differences invisible to most southern Canadians. The common heritage of the children participating in the present study provided a basis for the direction of the treatment; however, consideration had to be given to individual differences in language achievement due to cultural and socioeconomic variance within the sample.

Influence of Curiosity

Capacity for curiosity may encourage or inhibit inquiry. A curious inquirer tends to invite new experiences, perhaps because curiosity itself is a process which satisfies the learner; he enjoys not knowing the answers because he enjoys the process of finding them (Beswick, 1971). The inquirer enjoys placing in jeopardy his cognitive map which Beswick (1971) defined as a simplified grouping of past experiences to which new experiences are referred and examined for meaning, so that new experiences can be ordered with reference to it. By contrast, a person of low curiosity avoids inquiry. He does not enjoy the processes of asking questions, of comparing new ideas with present knowledge, and of evaluating new knowledge against an existing norm.

Maw and Maw (1962) described a highly curious person as one who thoroughly scans his environment because he wants to know and understand what he perceives. They stated that a child who is willing to manipulate or explore incongruous stimuli, who wants to know more about himself and his environment, who seeks out new experiences, and who persists in examining new stimuli in order to learn about them demonstrates a capacity for thought and inquiry. What he learns through these activities is new to him, and a discovery of something new is an act of creativity. Maw (1971) also asserted that curiosity is a link in a chain joining capacity and creativity and that the interaction of these three links provides motivation for inquiry. Not only does a person of high curiosity ask more questions; but he also asks more probing, more imaginative, and more detailed questions (Peel, 1971). The extent of his curiosity, therefore may be considered in terms of both quantitative and qualitative criteria.

Authorities have identified different types of curiosity, among them diversive curiosity and specific curiosity (Berlyne, 1965, 1970, 1971; Day, 1971). Diversive curiosity frequently results in diversive exploration of an unchanging or monotonous environment in search of unusual stimuli (Berlyne, 1965; Day, 1971). It encourages free-associative or autistic thinking rather than thinking directed towards problem-solving (Berlyne, 1970). Specific curiosity leads to specific exploration of stimuli. A person in a state of specific curiosity reacts positively to unusual elements in his environment by expressing interest in them through exploring, investigating, or moving towards them, and he persists in these activities in order to gain information in the process (Day, 1971). Specific curiosity is manifested by exploration directed

towards portions of the external environment when there is a specific lack of information; that is, when the learner is in a state of uncertainty. It results in reasoning or directed thinking (Berlyne, 1966, 1970).

Peel (1971) suggested that both curiosity and interest are essential for learning and thinking, and that associated with curiosity is the need to resolve inconsistencies in the nature of the information itself. He distinguished between general uninformed curiosity about ideas, concepts, or projected happenings, which is most fully aroused by partly familiar stimuli and best maintained by a balance of complexity and novelty; and long term curiosity which develops into an interest or serious study of specific subject matter. Peel also stated that conflicting information and novel stimuli provoke curiosity, especially in the more curious child. Berlyne (1965) also described epistemic (knowledge-seeking) inquiry in terms of its being not at its maximum with total ignorance, but as increasing, to a point, with increasing knowledge. Later (1970), he stated that epistemic curiosity led to directing spoken or written questions to another person or to written material.

The effect of curiosity on inquiry may be summarized briefly as follows. The more curious the learner, the more he searches for answers to explain the unusual or the unknown, the more questions he formulates, and the less satisfied he is with superficial or casual answers. However, whether or not the school can facilitate learning through an appeal to curiosity is contingent upon many unknown factors (Maw, 1971).

Influence of Mind Set

Perception of and response to stimuli are influenced by a mind set which is both flexible and tentative. Pringle and McKenzie (1965) defined flexibility in terms of the ability to break a previously induced mind set in order to solve a problem. Mind set can be induced by specific instructions about problem-solving procedures, results desired, or materials used. If a set method of problem-solving is practised and results in desired achievement, the nonflexible learner experiences difficulty in altering his mode or strategy in order to solve a problem which is different in some way from the problem he has practised. The flexible learner, however, modifies or adapts his strategy according to the learning situation (Pringle & McKenzie, 1965). A rigid mind set, therefore, restricts both thinking and inquiry to certain practised patterns.

Guilford and Merrifield (1960) discussed two types of flexibility: spontaneous and adaptive. Spontaneous flexibility is the tendency to seek many informative answers; adaptive flexibility is the tendency to alter modes, strategies, or techniques, particularly when working on a difficult problem. Spontaneous flexibility ensures a variety of outcomes; adaptive flexibility, a production of unusual and unconventional ideas.

The habit of tentative thinking tends to expand capacity for inquiry. The tentative thinker shows his ability to tolerate ambiguity and to suspend judgement through his use of suppositional and conditional terms such as "perhaps", "maybe", "it seems that", and "I think that". This tentative quality indicates a mind set willing to consider several

solutions or possibilities. Loban (1967) indicated that tentativeness is a quality found more among high achieving students than among low achievers. Whether or not this finding suggests that high achievers ask more questions and seek more information than do low achievers has not been determined. It does suggest, however, that tentative thinkers are willing to search for several solutions and to consider many alternatives, rather than settling for only one response.

Within the context of the present study, the children were provided with opportunities to search for many problems and answers appropriate to them. Generation of unusual and unconventional methods and responses was encouraged. Selection of the best answer, where needed, was reinforced. Tentative statements made during the process of inquiry were discussed, extended, and often left unresolved; closure was not often attempted.

Levels of Learning

The levels of learning hypothesized in the model are those postulated by Gagné (1968). The lowest level concerns stimulus-response (S-R) connections, the response to stimulus usually being a fairly precise physical movement as exemplified by animal training. Chaining or motor skill learning requires linking two or more S-R units in proper order, as in tying a lace, printing a word, or throwing a ball. Verbal chaining or association requires the ability to name objects or people. Links in these chains are verbal units. Verbal associations may be acquired by verbal mediation which provides an internal link. For example, if a student is learning the French phrase *avoir faim* meaning *to be hungry*, *to be famished* would provide verbal mediation. Making multiple

discriminations requires differentiating between like stimuli. A teacher learning the names of all the children on the roll is making multiple discriminations in order to differentiate each child from his peers. The fourth level concerns concept formation and attainment. Concepts were defined by Gagné (1968) as being abstractions of concrete parts of the environment. Those studied by elementary school children include mathematical concepts such as addition, volume, or linear measurement. Simple rules are principles or generalizations formed by combining two or more concepts. For example: "A whole is greater than each of its component parts." "A whole is equal to the sum of its parts." Complex rules, which are hierarchies of principles or simple rules, are used to solve problems or to achieve goals, and are, therefore, at the highest level of the scale. A child may use his knowledge of complex rules to play a game, prepare an assignment, or build a model.

In developing this model of the levels of learning, Gagné (1968) theorized that learning is cumulative and contributes to human development. The child learns in an orderly sequence a set of capabilities which build on each other from simple to complex through the processes of remembering, differentiating, and transferring knowledge. New learning depends mainly on combining previously learned matter and transferring it to a new situation. The interaction of the structures created by combinations of concepts and rules results in increased mental competence and self-initiated thought. The stage of development that a child has reached is related to what he already knows and to what he has to learn, rather than to his physical age (Gagné, 1968).

The child's ability to master a given level of learning is

limited by his intelligence, motivation, socioeconomic background, physical health, and learning environment (DeCecco, 1968). These factors impinge upon Gagné's learning scale at all levels. Individual differences resulting from these limiting factors were considered during the course of the treatment, and provision was made for acceptance of a variety of responses to the stimuli.

Perception of Stimuli

The perceptual process has been described by Smith (1971) as follows:

> [It] clearly involves components of prediction, identification, and interpretation as well as the subjective experience of "seeing" or "hearing" or "feeling" that is the final stage of the process ... The beginning of the process is an unidentified and uninterpreted "happening", the impact of information from the world on our receptor systems. This unstructured raw material is what is generally called the stimulus; ...
>
> (p. 71).

The learner's willingness or reluctance to grapple with the elements of prediction, identification, and interpretation of the stimulus influences to a marked degree his ability to inquire. Smith, et al. (1970) posited a " ... metatheory of interaction between the individual and his environment ..." (p. 320), by which a child sends messages into his environment through his emotions and actions, and receives messages from it. Upon reception of an environmental message or perception, he reorganizes it and sends out new messages. If, during the reorganizing stage, he investigates the new perception in relation to his previous knowledge,

he begins to ask questions, make comparisons and predict outcomes. In effect, he begins to learn. Stimuli which arouse the greatest curiosity and the greatest desire for inquiry tend to be those objects, messages, or thoughts which possess qualities of novelty, surprise, complexity, ambiguity, incongruity, or discrepancy (Berlyne, 1966, 1970).

When the learner confronts new stimuli, his attention is arrested by some novelty in the situation: new events, challenging questions, or unusual occurrences which cause bafflement or stir speculation. Confrontation, the initial step towards full perception of stimuli, is followed by awareness, the act, not of rejecting nor of suppressing perception, but of permitting the mind to wander about the subject recalling former associations, ideas, speculations, and feelings. Confrontation is immediate; awareness, somewhat delayed; the delay being caused by the need to identify and interpret the percept itself (Smith, et al., 1970).

Selection of stimulus devices for the present study was based upon the criteria set by Berlyne (1966, 1970). To some degree, each possessed the quality of novelty, surprise, complexity, ambiguity, incongruity, or discrepancy. Treatment was structured to encourage rapid awareness of the stimulus.

Conceptual Conflict

When the symbolic response to a puzzling object, message, or thought is incompatible with present knowledge, the outcome of perception is conceptual conflict (Berlyne, 1966, 1970). In order to resolve the conflict, the child needs to acquire knowledge to fill the gap between what he knows (old) and what he experiences (new). To gain the knowledge he needs, he asks questions. As soon as he asks

a question, he is in a state of uncertainty because he does not know what answer he will get.

Berlyne (1965) described six main types of conceptual conflict. Doubt is the conflict between believing and disbelieving the same statement, or denying and ascribing reality to a phenomenon. For example, conflicting information about a character or situation in a story arouses a feeling of doubt which may be resolved by reading further to determine which statement is accurate. Perplexity is the conflict arising when it is impossible to know which is true; perceived factors suggest mutually exclusive beliefs. Perplexity subsumes doubt and is often more difficult to resolve because of the complexity of the conflicting ideas. A tangled or involved story or problem may induce a sense of perplexity. Contradiction is a logically incongruous statement which denies itself, resulting in intense conflict because two incompatible beliefs are forced on the learner. It is often an explicit and categoric denial of an assertion, action, or event. Until the learner can discover the motivation or the reason for the contradictory statement, he is in a state of conflict. Conceptual incongruity occurs when properties regarded as incompatible are deduced as being together. Berlyne (1965) cited as an example, the condition of the person who, believing that fish die out of water, hears of the mudskipper that walks on dry land. Confusion results when ambiguous patterns of stimuli are perceived and implications of the perceived stimuli are not clear because the truth is difficult to determine and alternative responses are not forthcoming. Perception of hybrid plants and animals having the distinguishing characteristics of two species may result in confusion. Irrelevance occurs upon per-

ception of stimuli which are not applicable nor pertinent to the context. Misleading information or inaccurate instructions are examples of irrelevance.

Berlyne (1965) cited Morozova and her associates in his conclusion that interest in learning is a direct result of conceptual conflict, and interest in reading results from being able to experience this conflict vicariously by identifying with the struggles of a hero and his successful efforts to overcome difficulties. This vicarious resolution satisfies the reader's curiosity and induces further inquiry. Berlyne (1965) summarized the effect of conceptual conflict upon learning by noting that effective learning is promoted by exploiting the " ... reinforcing potentialities of conflict reduction ..." (p. 267). This learning encompasses both mastery of subject skills and facts, and habits of independent inquiry.

Beswick and Tallmadge (1971) maintained that conceptual conflict might appear either with novel stimuli or with the introduction of structure.If an individual cannot assimilate the stimuli or the structure, conflict results. They described curiosity in terms of the individual's readiness to resolve, keep, or seek these conflicts; and they maintained that conflict-producing situations arouse curiosity in the curious and avoidance in the incurious. Beswick (1971) also contended that learned strategies influence the choice between exploration and avoidance. Although a curious person may be open to novel stimuli, he is discriminating in ordering and assimilating them.

Whether or not a learner initiates the process of inquiry, therefore, seems contingent upon factors affecting initial perception of

stimuli, capacity for conceptual conflict, and strategies learned to cope with the conflict. If the conflict results in stress, which may be described as the strain felt when conceptual conflict cannot be resolved, avoidance of the stimuli causing the conflict results. Avoidance may take the form of rejecting, shunning, or ignoring unusual stimuli. If, however, the conflict results in exploration and examination of the new elements in the environment, and the learner moves towards the stimuli as indicated by eye movements, head-turning, locomotion, or manipulation, he is aroused and intrinsically motivated to learn (Berlyne, 1965, 1970).

During the course of the present study, attempts were made to arouse conceptual conflict through the presentation of ideas and activities which might result in feelings of doubt, perplexity, contradiction, incongruity, confusion, or irrelevance. It was assumed that opportunities to examine the ideas and participate in the activities would result in conflict-reduction and that effective learning would ensue. Emphasis was placed on the desirability of forming habits of independent study and inquiry which would be, of themselves, self-reinforcing and self-motivating. It was recognized, however, that all the subjects would not be equally curious, and that arousal or reduction of conceptual conflict would not be the same for each individual either quantitatively or qualitatively.

Inquiry and Language

The theoretical framework of the present study assumed that exploration resulting from the conceptual conflict aroused by perception of

unusual stimuli results in inquiry into the nature of the stimuli through the symbolic response of language. Progress in school presupposes the child's ability to think (Peel, 1967); and language, the verbalization of thought, is often the criterion upon which learning is evaluated. There are three general types of thinking: thematic or imaginative thinking used in the creative arts and literature; explanatory thinking for describing events and happenings; and productive thinking which results in new products and inventions (Peel, 1967). A more complex type of thinking innovates new systems or theories or integrates dissimilar facts and explanations; usually, it is seen at work only in the most able child or adult (Peel, 1967). Integrative thinking proceeds by experiment and observation along a route determined by the learner's goals and directions. The learner does not merely alter hypotheses as he proceeds; he creates new and better ones, and he uses deductive reasoning to synthesize them with present knowledge. Integrative thinking combines three forms of attack on learning: " ... delicate experiment, logical analysis and epistemological consideration ..." (Peel, 1967, p. 33). The elementary school child may use all four types of thinking but only in terms of his immediate experience and situation.

Vygotsky (1961) stated that a word and a thought are unified through meaning, and that meaning changes and develops because it is not static, but dynamic. Verbal inquiry, therefore, may also be considered to be linked through meaning to thought, inquiry being one method of determining meaning by discovering the relationships and implications of ideas and inventions. The present study is concerned specifically with verbal inquiry in an elementary language arts context. The very

young may inquire through enaction (motor response) or imagery, but in school, language is the preferred mode (Bruner, 1966).

Language is " ... the universal vehicle of patterns ..." (Shulman, 1966, p. 29). A child who discovers something for himself can talk about it in his own language, thereby retaining and applying the idea effectively as part of his own language system. He develops an appropriate linguistic pattern based on his own experiences and explorations. The questions he asks and the answers he seeks reflect this linguistic pattern. Gagné and Smith (1962) noted that subjects who verbalized as they solved problems were able to state fully adequate verbal principles of the task solution. They concluded that requiring verbalization may result in improved recall and understanding. Bromwich (1972) suggested that encouraging children to think aloud as they reflect upon their problems helps them to plan and organize their ideas.

Dimensions of Inquiry

For the purposes of discussion and clarification, the inquiry process is hypothesized as having both an objective and a subjective dimension. Objective inquiry posits the application of logical thought; subjective inquiry, the manifestation of intuition and responsiveness (Bruner, 1966; Burkhart & Neil, 1968; Peel, 1967). Application refers to the act of putting to use certain principles or strategies of inquiry, especially those strategies which are carefully reasoned, or which consist of a step-by-step analysis of problems. Intuition, on the other hand, refers to the

> ... act of grasping the meaning, significance, or structure of a problem or situation without

> explicit reliance on the analytic apparatus of one's craft ... (Bruner, 1963, p. 60).

Responsiveness concerns the act of reacting readily to stimuli; it implies a willingness to withhold judgement and to consider several perspectives or points-of-view.

The Objective Dimension

The objective dimension of inquiry implies the presence of subject-specific curiosity induced by conditions of stimulus uncertainty (Peel, 1971). Peel described subject-specific curiosity in terms of a long range interest resulting in specialized knowledge. Since uncertainty provokes more curiosity than does complete ignorance, partially familiar material enhances subject-specific curiosity, and encourages the child to pose more questions about it than about completely unfamiliar material (Peel, 1971). By applying the principles of logic and of epistemic inquiry, the child creates or discovers new things and develops the ability to evaluate and verify his own work and the work of others. Essentially these inquiry principles include the formation of generalizations, propositions, relevant analogies, hypotheses, theories, concepts, and rules (Berlyne, 1965; Peel, 1971).

Objective inquiry posits thinking by proposition (Peel, 1967). A proposition is a logical statement affirming or denying something so that it can be characterized as true or false. An elementary school child can form propositions, but he may not be capable of interrelating them. He can, however, apply principles of scientific experimentation and consider logical hypotheses (Guilford, 1967). His inquiry approach may take the form of hypothesis-testing through following a series of carefully delin-

eated steps: a) stating the problem; b) generating a theory about a possible solution to the problem; c) gathering relevant data to test the theory; d) organizing and observing the data; e) drawing conclusions from the data; and f) accepting or rejecting the theory on the basis of the conclusions. This process involves manipulation of sensory and cognitive data by engaging in logical reasoning, and by applying that reasoning directly to the environment. Berlyne (1965) felt that a child can: a) learn to examine the similarities and differences between observed phenomena, b) manipulate concrete objects, and c) involve himself through his senses with his immediate environment. Suchman (1960) believed that a child can learn to probe for an answer to his questions, and that when he has obtained his data, he can learn how to organize it and draw conclusions from it. Clark (1969) was concerned with the wording of problems. In his study of how a person stores and retrieves information from sentences, he found that the main difficulties in problem-solving lay more in the wording of the problem than in the problems themselves. This finding tends to confirm the contention of Gagné and Smith (1962) that verbalization of a problem increases the likelihood of solving it.

The strategy a child uses to solve a problem may be observed by asking him to think aloud as he solves it. Poor problem-solvers cannot generalize effectively. Able problem-solvers follow no set pattern, but use several approaches and modes. A learner who can give structure to a problem through the use of relevant analogy, simple classification, class order, or multiplicative classification (as in contingency tables) gains insight into the problem and direction towards a solution of it (Peel, 1967).

Objective inquiry utilizes convergent thinking; that is, thinking which draws upon a number of stimuli to obtain a satisfactory response. Smith *et al.* (1970) described convergent thinking as the act of closing logically on patterns by narrowing gradually the range of solutions. Guilford and Merrifield (1960) defined convergent production explicitly to be, "Generation of information from given information, where the emphasis is upon achieving unique or conventionally accepted or best outcomes" (p. 5). Later Guilford (1967) stated that tests of convergent thinking feature logic-tight deductions determined solely by given information. The elementary school child is capable of convergent thought production even though he is stimulus-bound; that is, he can consider quantities, relations, and classes if the objects are present for his perception. He depends upon perceived data until about age eleven or twelve when he becomes able to deal with what Guilford (1967) calls timeless and spaceless information.

The ability to reason logically from concrete example to abstract idea is yet another aspect of objective inquiry. Elementary school children are adept at manipulating concrete objects, and if encouraged to verbalize as they manipulate, they are able to draw inferences and conclusions about the properties of the objects they are manipulating. Integration of this information comes with maturation. However, even young children or unskilled learners can master simple components of a complex activity if the activity is separated into its several parts (Bruner, 1960, 1964, 1966).

In summary, the objective dimension of inquiry is concerned with appropriate solutions to problems through the inductive or semideductive

discovery of concepts, relations, principles, or patterns (Morine & Morine, 1973). It is mainly a search for answers to problems; answers which must be ordered, evaluated, and accepted or rejected with reference to a predetermined norm. Opportunities for engaging in this search were provided, during the present study, through critical examination of factual prose and explicit inquiry into language usage.

The Subjective Dimension

The subjective or suppositional dimension of inquiry implies the presence of diversive curiosity leading to wide-ranging exploration of the environment. Diversive curiosity may result in free-associative thinking, autistic thinking, imaginative play, or other unstructured responses to novel, complex, or surprising stimuli (Berlyne, 1970). The learner seeks, not for information leading to a solution of a given problem, but for information leading to a change in environment (Day, 1971). In effect, he scans his environment searching for new experiences which attempt to explain, describe, or judge the stimuli he perceives.

Subjective inquiry posits thinking by supposition; suppositional questions are drawn from personal experience, perception, opinion, and attitude. The word _you_ is found in this type of inquiry which requires involvement with a particular point-of-view or identification with a character or cause (Burkhart & Berheim, 1963). Burkhart and Neil (1967) argued that suppositional thought is necessary for cultural survival in a world which needs a multitude of new ideas every day. They insisted that suppositional questions subsume problem-solving (procedural and

methodological) and conceptual questions because suppositional questions require viewpoints giving a statement of position. Subjective inquiry, they contended, is more a search for problems than for solutions, for questions rather than for answers.

The subjective inquiry process may be observed most readily in play situations. Changes in knowledge and circumstance may result in a constant process of invention which can be observed in role play, games, dramatic play, and creative drama where the child, assuming the role of another being, is constrained to confront problems and points-of-view with which he may not be familiar. This process may indicate also the learner's attitude towards his own thinking powers and his own ability to generate informed guesses and thoughtful questions (Bruner, 1966).

Subjective inquiry utilizes divergent thought processes which produce several responses and solutions, any one of which may be appropriate to the situation. Divergent thought has been described as the act of moving outwards from a given situation, and imagining many possibilities (Smith, et al., 1970). Guilford and Merrifield (1960) have defined divergent production explicitly as, "Generation of information from given information, where the emphasis is upon variety of output from the same source" (p. 5). Guilford (1967) also stated that the component abilities of divergent thinking included fluency, flexibility, originality, and elaboration. The creative or divergent thinker develops both a sensitivity to problems and the intellectual abilities needed to cope with problem-solving. He does not ask the conventional question nor search for the conventional solution.

Suppositional questions require that an individual move into a new world or into someone else's being; they require a basic alteration of self, a responsiveness to a new environment (Burkhart & Berheim, 1963). Self-involvement with and self-projection into the new environment encourage the learner to use his past experiences and his intuitions to examine unusual stimuli in order to learn more about them. Through self-involvement, the learner commits himself to a certain mode or cause or includes himself in a new environment. Self-projection implies a more active concern with a new environment; the learner must impel himself forward or onward by fantasy, supposition, or imagination in order to discover new perspectives. Intuition gives direction to the inquiry; responsiveness reveals the learner's readiness to make appropriate connections or associations to form new perspectives (Bruner, 1963; Wheelwright, 1954). Wheelwright (1954) stated that inquirers must not omit " ... unorthodox kinds of significant questions ..." (p. 7), since it is the unorthodox that may determine new patterns.

In summary, the subjective dimension of inquiry is concerned with producing a point-of-view or a statement of personal opinion or attitude. It is aware of perspective and potential; and is evaluative in that it plans ahead and considers consequences. The use of <u>if</u> followed by <u>then</u> characterizes subjective inquiry. It utilizes the transductive discovery approach of divergent and imaginative thinking leading to artistic creation (Morine & Morine, 1973). During this study, opportunities for engaging in suppositional inquiry and discovery were provided through examination of imaginative literature and through participation in creative writing, drama, and inquiry games.

Development of the Thought Content of Questions

In the theoretical model posited for the present study, interaction of these two dimensions affects development of the thought content of questions. It is hypothesized that these dimensions impinge upon the taxonomy of cognitive behaviours (Barrett-Clymer, 1968) at all levels: literal comprehension, reorganization, inferential comprehension, evaluation, and appreciation; and that their interaction leads to the formation of new concepts and principles. The questions that a child asks in relation to what he hears and reads are also described in terms of this taxonomy. Literal comprehension focusses on explicitly stated ideas and information. Questions at this level seek the recognition or recall of facts. Reorganization requires the analysis, synthesis, and organization of explicitly stated ideas and information. Here the skills of classifying, outlining, summarizing, and synthesizing are needed. Inferential comprehension requires that the individual use his own experiences and intuitions when considering explicitly stated ideas and information in order to theorize or hypothesize to solve a problem. Questions at this level are the result of both divergent and convergent thought. Evaluation requires judgement. These questions involve comparisons of ideas, accuracy of information, differentiation between fact and opinion and between reality and fantasy. Appreciation requires intellectual and emotional interaction between the child and the material he is exploring. At this level, questions identify and involve the child with a character, a point-of-view, or a cause.

Thinking skills may be developed through any of the general modes of inquiry which influence the development of concepts and principles

affecting reading and listening skill attainment. According to Evanechko (1972), these modes of inquiry include the following:

perceiving	recalling	selecting
observing	discriminating	evaluating
identifying	abstracting	imagining
associating	generalizing	integrating
comparing	inferring	synthesizing
classifying	hypothesizing	interpreting
organizing	analyzing	

Table 2 summarizes the inquiry process in terms of convergent and divergent thought.

II. RATIONALE FOR THE DEVELOPMENT OF INQUIRY TRAINING PROCEDURES

The Need for Inquiry Training

Various authorities have asserted that inquiry training for discovery learning is desirable (Berlyne, 1965; Bruner, 1960, 1961, 1966; Larsen, 1968; Mosher & Hornsby, 1966; Suchman, 1960, 1962, 1963). Bruner (1960) maintained that in order to interest the child in the world of ideas, he must have a sense of discovery, an interest in what he is learning, and a suitable set of values and attitudes about the discovery process. He later (1961) stated specifically the benefits to be derived from making one's own discoveries: a) increase of intellectual power; b) growth towards intrinsic reward; c) learning-through-use of the heuristics of discovery; and d) aid to memory. He presented the hypothesis that learning to discover for oneself helps one to use the acquired information in a practicable, workable way. He also suggested that discovery itself is self-rewarding in that it provides a " ... competence motive..." (p. 27) and an opportunity for the child " ... to experience success and

Table 2

The Inquiry Process as an Expression of Convergent Thinking and Divergent Thinking (after Armstrong and Evanechko, 1973)

Inquiry Process	Common to Both	Convergent Thinking	Divergent Thinking
1. Perceptual Orientation	Child is stimulus bound; the objects must be presented for perception.	Perception of stimulus is related to personal, actual experience.	Perception of stimulus is related to imaginary or imaginative experience.
2. Purposes	To discover new facts, concepts, or principles.	To narrow the field of inquiry to determine the best answer.	To extend the field of inquiry to determine many solutions or to locate new problems
3. Model	Based on curiosity about unusual stimuli.	Based on specific, epistemic curiosity.	Based on diversive, ideational curiosity.
4. Components	Cultural heritage. Level of learning. Curiosity. Mind set. Perception of stimuli. Resolution of conceptual conflict.	Control. Selection of viable alternatives. Conformity with a stated norm. Restriction to essentials.	Fluency. Flexibility of choice. Originality of ideas. Elaboration of detail.

Table 2

The Inquiry Process as an Expression of Convergent Thinking and Divergent Thinking (Continued)

Inquiry Proces	Common to Both	Convergent Thinking	Divergent Thinking
5. Emphasis in Problem Situations	Careful wording of both problem and solution.	Conclusions based on knowledge. Drawing of deductions that are logic-tight. Formulation of propositions.	Conclusions based on possible alternatives. Drawing of deductions to synthesize new information with old. Formulation of suppositions.
6. Thought Processes	Productive or integrative thinking.	Explanatory thinking. Use of analogy and logic.	Thematic or imaginative thinking. Use of impression and intuition.
7. Questioning Process	Spoken or written verbalization of the process and results of inquiry.	Constraint-seeking and hypothesis-testing questions. Search for one best answer.	Suppositional questions. Search for many answers and problems.
8. Evaluation of Inquiry Process	Results encourage continued inquiry. Intrinsically motivating. Self-rewarding.	Results are answers best suited to the solution of the problem. Results are conventionally acceptable.	Results produce new ideas and new systems.
9. Expression	States the results.	States the ideal.	States the possible.

failure not as reward and punishment, but as information" (p. 28). A child may learn the heuristics of discovery in two ways: either by studying its formalized aspects, as in logic or mathematics, or by engaging in the process of discovery itself. Bruner (1961) emphasized that it is only by practising inquiry that a learner may improve his ability to inquire. Inquiry aids memory because its organization relates to the individual's own cognitive struture and interests and, therefore, information gained by inquiry is readily retrievable.

A child must have an effective strategy for inquiry purposes; a strategy which permits a balance between the degree of certainty with which a solution is reached, the speed with which it is reached, and the cognitive strain involved in reaching it (Mosher & Hornsby, 1966). Such a strategy can by developed in a situation where a child is able to develop cycles of questions that narrow from general to specific. According to Mosher and Hornsby (1966), if a child can use the three processes of constraining, assessing, and specifying he can reach a conclusion.

Suchman (1963) felt that children needed guidance in order to develop principles of inquiry. He recommended the use of guided practice sessions in which children are led to discover relevant principles through the use of yes/no questions. By 1971, however, Suchman had concluded that children are by nature inquirers capable of developing their own strategies. That they do not do so in school, he asserted, is because they feel no desire to ask about the concerns of the classroom.

Progress results from the discovery of the right question (Berlyne, 1065). By asking the right question, the learner reveals that he has noted previously overlooked similarities and differences among observed

phenomena. Because of its highly motivating force, a question can be ignored only with extreme difficulty; there must be some attempt made to reply. The learner who is aware of gaps in his knowledge questions those gaps and is motivated to search for answers to fill them. The discrepancies he observes, the questions he asks, and the answers he seeks are all contingent upon his language skill and development; he cannot pose questions for which he has no words (Berlyne, 1965).

Larsen (1968) suggested that in order for a child to be familiar with his own world: its details, facts, relationships, and the implications of these relationships; and to be able to transform this knowledge into new forms, he must engage in a process of systematic questioning. After having asked and answered his own set of questions, he must organize his information, evaluate it, and so begin to create, synthesize, and invent. This type of inquiry requires also a statement of position (Burkhart & Neil, 1967) and a responsiveness to the environment (Wheelwright, 1954).

The Relationship between Inquiry and Reading (Table 3)

That there is a relationship between reading performance and question-asking has been asserted by many authorities. Schwab (1958) maintained that through inquiry a reader may gain new meanings, attitudes, or perceptions from the material by applying the written discourse to his own experiences and situations. Allen (1969) stated that for children, learning is often an endless round of trying to remember millions of answers to questions they themselves did not ask. The teacher, therefore, must develop procedures that will motivate

Table 3

Postulated Relationship Between Inquiry Training and Language Reception Skills

Modes of Inquiry Used to Further Reading and Listening Skill Development			
observing	identifying	abstracting	evaluating
perceiving	associating	generalizing	imagining
recalling	comparing	inferring	integrating
discriminating	classifying	hypothesizing	synthesizing
selecting	organizing	analyzing	interpreting

Reading Skills	Listening Skills
Acquisition of knowledge -instructions, directions -information -essays, editorials -special materials, maps charts -reference skills	Acquisition of knowledge -instructions, directions -information -note taking -summarizing
Critical reading -ability and criteria for screening information -awareness of and ability to identify devices used to influence acceptance and belief -an open but skeptical mind	Critical listening -ability and criteria for screening information -awareness of and ability to identify devices used to influence acceptance and belief -an open but skeptical mind
Aesthetic and evaluative function -reads stories, novels, poetry, nonfiction, drama effectively	Aesthetic and evaluative function -listens effectively to stories, poetry and drama

(For a detailed summary of reading and listening skills, see Tables A and B in the appendix.)

Measurement of the Effect of Inquiry Training on Reading and Listening Skills	
Reading	Listening
Basic vocabulary	Literal comprehension
Reading for information	Interpretation
Reading for relationships	Evaluation and application
Reading for interpretation	General comprehension (See Table 5)
Reading for appreciation	
Reading for literal comprehension	
Creative and imaginative reasoning	
General comprehension (See Table 4)	

children to ask valid questions. Allen suggested these examples. Who am I? What can I do? What can I observe and hear in my world? How is what I observe and hear related to the printed material I see? How can I find out what others have observed and heard and thought about? What is in my imaginary world? Betts (1961) asserted that the best motivation for reading comes from questions formed by the self about reading material. As they question, children think about what they read, and they learn to think critically by questioning critically. Thinking is essential for reading, and children who cannot think outnumber those who have not learned essential phonic skills.

Carner (1963) felt that critical reading depends on the ability to ask the right question at the right time. He stated that children must be taught how to ask questions at the concrete or recall level, at the abstract or analytic level, and at the creative thinking level; he emphasized that these skills do not appear of their own volition, but must be learned. Carner described the concrete level as dealing with simple ideas, concepts, and facts; this level is used when reading to follow directions. The abstract level requires the ability to generalize, relate, classify , sequence, infer, conclude, and evaluate. The creative level involves the synthesis of new information with previous knowledge to form new patterns; questions at this level are usually open-ended. These levels of questions refer to teachers' questioning techniques, and should serve as models for children to follow as they develop critical reading skills.

Descriptions of critical reading include the following. Spache (1963) stated that critical reading demands the intellectual and

emotional interaction of reader and author, and requires a mastery of essential comprehension skills, an analysis of and a reaction to the material, a questioning mind set, a willing suspension of judgement, and an awareness of prejudice and inadequate facts. Russell (1963) asserted that critical reading is equivalent to critical thinking and involves three factors: a) a questioning attitude involving suspension of judgement; b) a functional approach to logical inquiry and problem-solving; and c) an ability to judge or evaluate according to a predetermined norm. He stated that a questioning attitude is not innate, but learned.

Bruner (1966) cited McNeill's statement on critical reading.

> The basic skill, supporting all others, is reading critically. "Critical" is not the name for what I mean, but I have been unable to think of a better one. Critical reading is not the same as reading fluently. It is, instead, something like the ability to see the connotations of sentences. The critical reader gets beyond the material literally referred to and perceives that the sentence is relevant to a larger domain. My assumption is that the parallel between critical reading and formal reasoning is very close ... (p. 169-170).

The statement concludes that most elementary school children are unable to read critically except in simple cases because they are dealing with abstract material. Stauffer (1960) held that children can think and read critically about matters relating to their experience and that they can master these critical reading and thinking skills: a) making associations, generalizations, and comparisons; b) indexing, estimating, examining and evaluating material; c) extending concepts; and d) comparing new information with a given norm or standard. He commented

also on the need for children to think about events in their own experience so that they may set their own purposes for reading and reason logically from what they already know as they read. Subsequently they may compare new information with old, and either reject or accept it. For the purposes of research and study, Stauffer (1965) identified five types of thinking: associative, convergent, problem-solving, critical, and creative. He stated that the able reader uses and integrates all five by being alert for cues, by searching for valid inferences, by following a logical, step-by-step line of reasoning, and by drawing sound conclusions through hypothesis-testing behaviour. Reading thus becomes a thinking process in which evidence is found and tested in order to identify what is truthful and relevant. Harvison (1967) stated that the child must first be adept at vocabulary and comprehension skills before he can be expected to be critical, but through the skilful use of group discussion or through the setting of specific purposes, he can learn to see the relationship of the material he is reading to a wider domain. Harvison (1967) enumerated the judgemental task skills which a child can master. They included being able to: determine the relevance of the material, detect conflicting views and contradictions in the material, detect bias, determine if the material is out of date, detect propaganda, and examine content for reliability and validity. Subskills included: evaluating tone, mood, and style in the light of the author's purpose, determining the author's authority, and evaluating the development of generalizations, hypotheses, assumptions, arguments, and theories. By relating these tasks to his own experience, even the young child can be taught to think and read critically.

The effect of an inquiring mind set on the reading of literature has not been discussed as extensively as has its effect on the critical reading of factual material. Parker (1969), however, held that although information reading skills are best learned in a problem-solving situation, stories can raise questions about character motivation, cause and effect, believable events, and experiences common to all people. Wheelwright (1954) emphasized the need for grasping the author's viewpoint, and for confronting the author's world and asking questions about it. He stated:

> All meaning has as its subjective condition a certain mental responsiveness -- a readiness to make connections and to associate this with that, a readiness to see this and that in a single perspective, as forming a single individuality ... Fresh associations can generate fresh meanings .... (p. 49-50).

Inquiry into imaginative literature, therefore, presupposes a capacity for forming fresh associations and generating new meanings which may coexist peacefully with the old ones, or restrict them, extend them or replace them. Questioning behaviour at the appreciation level of cognition (Barrett-Clymer, 1968) may, therefore, possibly reveal the learner's willingness to tolerate several perspectives during the course of inquiry.

Brown (1971) felt that experience is integral to gaining a knowledge of literature. He contended that the disciplines of knowledge are

> ... particularly relevant ... because they emphasize inquiry, structure, patterns, and relationships, which allow for involvement, discovery, and the free play of the imagination (p. 40).

A child who approaches literature as a discipline is free, therefore, to discover through his own mode of inquiry those ideas, attitudes, and concepts which are important to him. To become involved with literature implies first, an acceptance of it as written; second, an examination of its structure in order to appreciate its subtle meanings and effects; and third, a consideration of its underlying unity and order in relation to other works of art. Brown also stated that the intermediate school child is well able to understand the main ideas and patterns of literature. He is interested in fantasy, folklore, and adventure; in people and animals. He uses language with fluency and flexibility; he appreciates its complexity. He is fascinated by words and word-play, exaggerated characterizations, and new strange surroundings. He is able, therefore, to inquire into the motivations and perspectives of the characters and situations he reads about.

The Relationship between Inquiry and Listening (Table 3)

The relationship between question-asking and listening performance has not been described in any detail in the literature. Several researchers, however, have commented on the correlation between reading and listening (Duker, 1965; Lundsteen, 1969; Ruddell, 1966; Russell & Russell, 1959). Ruddell (1966) concluded that the relationship between listening and reading is significant, and quoted findings which asserted that from 25% to 60% of factors in listening account for variance in reading comprehension scores, depending on the skills tested; however, there is no cause-effect relationship implied. Smith _et al_. (1970) described critical reading as the counterpart of critical listening. Lundsteen (1966) affirmed that

critical listening processes and abilities exist and are related to other verbal and thinking faculties. Wees commented on the interrelatedness of listening and reading in terms of the structure of ideas.

> Listening is reading through the ears, so to speak, but with this difference, that the symbols themselves are only vibrations in the air and cannot be re-heard, as print can be re-viewed; they are of value only for the organization of ideas that they represent (6:8, p. 50).

It would seem likely, therefore, that if there is a relationship between reading and inquiry behaviour, there might also be a relationship between listening and inquiry behaviour which might affect the acquisition of the general listening skills: decoding, retaining knowledge, listening critically, listening aesthetically (Smith, et al., 1970). It would also seem likely that the highest level of listening, auding, defined as " ... responding with understanding or feeling" (Taylor, 1964, p. 13) might be expanded by increased questioning behaviour, and that critical and epistemic listening abilities might also be influenced. Because both readers and listeners often receive the information they expect rather than the message originally stated (Arnmon, 1969), training in specific questioning modes might increase ability at all levels of cognition: literal comprehension, reorganization, inferential comprehension, evaluation, and appreciation (Barrett-Clymer, 1968).

Summary

From this review of literature, it can be seen that the possibilities inherent in the inquiry approach to education might well be realized in a language arts context. The need for question-askers and problem-finders in society increases each year. Mackworth (1965) stated

that it was more important to find problems than it was to solve them, because the rate at which new discoveries are made depends upon the number of people who can formulate the problems. It would seem that one of the major tasks of the school is to encourage inquiry.

In light of this review, therefore, the following procedures were implemented during the treatment in an attempt to increase inquiry behaviour.

1. Unusual stimuli were selected in order to arouse conceptual conflict.

2. Various strategies and activities were introduced to permit conflict-reduction and induce inquiry. These included: a) playing yes/no games, b) role-playing, c) interviewing, d) gathering, organizing, and observing data, e) questioning for information from printed and spoken material; f) critically questioning printed and spoken material; g) questioning to identify an author's or poet's purpose or perspective; and h) dramatizing a given role.

3. Consideration was given to individual differences in scholastic achievement and in language ability by encouraging individual approaches, methods, and responses to the given tasks.

CHAPTER III

DESIGN OF THE STUDY

This chapter outlines the design of the study. The first section describes the development of the inquiry procedures used. It includes a discussion of the principles, model, activities, strategies, and organization of the unit. The second section contains a report of the purposes, activities, and evaluation of the pilot study. The third section examines the sample, instrumentation, and procedures of the major study. The final section summarizes the chapter.

Development of Inquiry Training Procedures

Principles of inquiry training. The principles underlying the development of the unit lessons evolved from a consideration of the theoretical framework posited for the inquiry process. It was assumed that inquiry through language was affected by cultural influences, level of learning, mind set, perception, curiosity, and tolerance for conceptual conflict. The dimensions of inquiry and their interaction with the taxonomy of inquiry behaviours, and the imputed relationship between inquiry and the reception skills of listening and reading also were considered. A summary of the major principles and postulates follows: a) The discovery of new information through inquiry is intrinsically motivating and self-rewarding. b) Question-asking is a complex of identifiable behaviours which can be learned. c) Question-asking strategies vary according to the individual and the situation; that is, a child needs to learn to ask different types of questions for dif-

ferent tasks. d) Unusual stimuli induce curiosity and inquiry. e) Provision must be made to enable the child to get answers and order them appropriately according to need and situation.

Model. An inductive/deductive curriculum unit model was used. During the inductive phase, inquiry strategies were developed through games, role play, and investigation into current language usage. The children worked in situations specifically designed to generate questions and answers appropriate to them. From this initial exploration of question-asking, they formed generalizations about question type and quality, sources of answers, and conditions of reply. In other words, they tried to indicate whether a question was procedural, substantive, or suppositional; whether an answer would come from themselves, another person, or the media; whether there was one answer or more than one; whether the answer would be readily forthcoming or delayed. After having considered these basic generalizations, they applied their questioning skills and their understanding of inquiry generalizations to specific reading and listening tasks. They studied how to question for information, how to compare and contrast given data, and how to develop suppositional strategies. The extent of their use of inquiry principles and strategies during the period of deductive application was limited by their understanding and appreciation of them.

Recommended activities for inquiry by teachers and students. Teachers were advised that during initial discussions, they should provide necessary structure, clarify ideas, accept student decisions, and respond to student needs. They should help the student a) probe for data and for method of operation, b) identify the product of his inquiry and make hypotheses to explain his findings, and c) identify his feelings and his judgements about his theory. Inquiry teachers should expect the student to explore alternatives, and to communicate and defend his conclusions in public. They should constantly encourage conjecture and clarification of ideas. They should observe and understand the student's inquiry behaviour, create classroom conditions conducive to inquiry, diagnose student problems, and institute inquiry into their own teaching procedures in order to strengthen the student's inquiry behaviour (Cross, 1970; Strasser, 1971).

Specific activities for students included a) getting involved in inquiry, b) learning to use the tools of inquiry: gathering, organizing, and recording data, c) developing a repertoire of appropriate inquiry processes and strategies, and d) eventually achieving the status of autonomous inquirers. The student's need to become actively involved in seeking the goal to which he was committed was emphasized throughout the study (Cross, 1970; Strasser, 1971).

Inquiry strategies. Several inquiry strategies were introduced during the course of the study in an attempt to show the children that different tasks require different inquiry techniques, that these techniques can be learned, and that they can vary from person to person and

from situation to situation.

Stimulus devices used to induce inquiry progressed from concrete to abstract, and from simple to complex. They included unusual objects, _yes/no_ guessing games, role plays, discrepant, conflicting, or ambiguous information, novel characters, complex situations, incompatible sound effects, and puzzling events.

The use of _yes/no_ question games was based on an idea developed by Suchman (1960, 1962, 1963) and by Mosher and Hornsby (1966). Suchman emphasized developing skills of scientific inquiry as a three-stage approach. First, the students were presented, by means of a physics film, with a concrete problem to solve. Second, they were required to ask _yes/no_ questions to obtain the information they needed to solve the problem. Third, they formed hypotheses using the information they had gained, and tested their hypothetical solutions against the data. Suchman (1963) identified these three stages as : episode analysis, determination of relevance, and induction of relational concepts. Mosher and Hornsby (1966) described the two types of questions as constraint-seeking and hypothesis-testing. The games developed for the present unit were based on the constraint-seeking, hypothesis-testing model. As in "Twenty Questions", the object of the games was to identify a person, place, or thing through a gradually narrowing sequence of inquiry. It was felt that games were intrinsically motivating and self-rewarding and would, therefore, provide a basis for exploring other questioning strategies and techniques leading to increased development of thought. Bruner (1966) stated that,

> To channel curiosity into more powerful intellectual pursuits requires precisely that there be [a] transition from the passive, receptive, episodic form of curiosity to the sustained and active form. There are games not only with objects, but with ideas and questions--like Twenty Questions--that provide such a disciplining of the channeling of curiosity (p. 117).

Methods of inquiry used by linguists are well suited to discovery methods of teaching; data is gathered, observed, classified, generalized, and revised (Josephson, 1969). Therefore, five lessons dealing with linguistics were developed, based on the following idea reported by Postman and Weingartner (1966). A tenth-grade class had been challenged by their teacher to produce a teen-age slang dictionary, for which they were required to write a preface, select items, and organize and report their data. During the course of the study, the students learned how to ask and answer meaningful questions; abandon ineffective strategies; observe, collect, organize, and verify data; and present results effectively. In the present study, the approach was modified, simplified, and shortened so as to be appropriate for use with grade five students who were required only to locate, record, and organize the slang expressions they knew or heard during the course of the study. The children, therefore, learned a similar process of inquiry, but at a much simpler level.

The two techniques developed for both epistemic and critical listening and reading were adapted from those suggested in the Science Research Associates (1958) learning kits. The reading technique includes the following steps: survey, question, read, review, recite (SQ3R). The listening technique is as follows: tune-in, question,

listen, review (TQLR). Before carefully examining material, the child is trained to survey and question it; thereby imposing his own purposes for studying it and for locating the specific information he seeks. As he consciously uses questions for locating main ideas, supporting details, or biassed viewpoints, he learns to evaluate and interpret the information he gains. Question-asking relating to imaginative literature was concerned with associations, patterns, and perspectives; and resulted in discussions, creative writing, art, and drama. The emphasis in this context was on self-motivated and sustained inquiry into another's actions or point-of-view.

Creative drama, the final activity for the whole unit, provided the children with an opportunity to listen to, read, and discuss a prose selection, assume appropriate roles for its dramatization, and demonstrate question-asking behaviour within their roles. Between the ages of seven and eleven years, children enjoy experimenting with characterization, movement, and language through improvization. Courtney (1971) hypothesized that their sequence of learning is as follows: "perception→action→description (dramatic and/or linguistic)→theory" (p. 59). This sequence permits children to watch, read, or hear a stimulus, interact with it, then describe it through words or mime; all before theorizing about it. The culminating activity in the present study, the performance of "Cuchulain" (Bulfinch, 1934), was an attempt to develop this process. Bruner (1966) commented on the importance of drama in the curriculum in these terms:

> Drama, the novel, history ... are all built on the paradox of human choice, on the resolution of alternatives. They are in the

> best sense studies in the causes and consequences of choice (p. 162).

Drama, therefore, became an inquiry strategy in that it provided opportunities for probing not only into motivations and meanings, but also into the conflicts and problems of the characters themselves.

Organization of the unit. A unit outline was provided for the teachers. This outline went with the lessons and included a statement of the major principles, the questioning strategies to be studied, and the activities, approach, evaluation, and extent of the unit. General instructions, lesson sequence, and testing schedule were also included. A small file contained the tape-recorded material, card games, and cards for the slang dictionary.

Lesson format was as follows: a) Notes provided essential background material, definitions, examples, and directions. b) Performance objectives stated the desired observable outcomes. c) The materials required for the lesson were listed. d) Skills needed to participate in the activities and to realize the objectives were listed. e) Detailed instructions provided guidance for implementing open-ended, divergent class activities. f) The method for evaluating attainment of the objectives was described (Cross, 1970).

Lesson sequence was determined on the bases of five generalizations which stated that the growth of competence in language, and consequently in inquiry, proceeds from oral to written, fluent to controlled, specific to general to applied, concrete to abstract, simple to complex (Armstrong, 1972).

Pilot Study

Subjects. The pilot lessons were conducted between January 22 and February 15, 1973 in Victoria, British Columbia. The subjects were thirty-three children in grades four and five enrolled in a heterogeneous class. There were five learning problem cases: one hard-of-hearing girl, one girl with poor vision, one East Indian girl who had not yet mastered English, one boy with a slight speech defect, and one slow learner (boy).

Because these lessons were primarily oral, informal, and exploratory in nature, it was decided to take the class as a unit and give inquiry training to the whole group. If the exercises had been limited to small group participation, very little direction in planning the unit lessons for the major study would have been provided.

Purpose. There was a dual purpose for working with the students in this class. The primary aim was to test certain lessons which were to be developed for the major study into inquiry strategies in a language arts context. The secondary aim was to acquire illustrative material for use in preparing the lessons.

Class activities. The following lessons were explored, in part, for the major study:

Lessons 1, 3	The use of yes/no questions to constrain, assess, and specify needed information.
Lessons 4, 5	A study of the common speech patterns as used in slang of children aged twelve and under.

Lesson 9	Recognition of the various levels of language usage in question asking: formal, informal, and casual.
Lesson 10	Statement of basic questioning principles.
Lesson 11	Discussion of question hierarchies in relation to the Barrett-Clymer taxonomy (1968).
Lesson 14, 15	Critical listening and reading.
Lesson 16, 17	Questioning imaginative prose.
Lesson 18	Questioning poetry.

Activities included reading and listening to various materials, questioning the materials, and discussing the questioning and its effectiveness in getting the desired information. Oral activities were tape-recorded for guidance and analysis.

Evaluation. Evaluation in the major study was concerned with the effect of inquiry training on listening and reading; however, the limited duration of the pilot study prevented effective evaluation of the results of training. Because of the need for exploring as many strategies as possible, it was decided to test and evaluate only in terms of interest in and enthusiasm for each activity. The evaluation was based on subjective observation during class and analyses of taped transcripts after class. It was found that the children exhibited considerable ability in asking relevant epistemic questions, that they readily developed sound questioning strategies, and that they enjoyed the lessons which were presented.

Design of the Major Study

Sample. The sample used in the major study consisted of six heterogeneously-grouped grade five classes from six different schools in Delta, British Columbia. Because of absences and transfers, the final sample consisted of 135 students, 66 in the control group and 69 in the treatment group. The classes were randomly selected from the population of heterogeneous grade five classes, and randomly assigned to one of two groups: treatment or control. Randomization procedures were assumed to be adequate control for the following variables: intelligence, sex, socioeconomic status, academic ability, educational background, type of school, and type of organization for instruction.

As a result of the random selection and assignment, two of the treatment classes were situated in two of the "pod" designed schools in which open-area team-teaching was possible. Each pod, or rectangular wing, contained two pairs of classrooms separated by cloakrooms and a corridor; and each classroom was separated from the other one of the pair by a retractable wall. Each classroom, therefore, could be treated as a separate entity, or as half of a team-teaching unit. The third treatment class was part of a large open-area classroom in which two teachers usually worked as a team. The control classes, on the other hand, were situated in traditionally designed closed-area schools. For the duration of the study, however, the treatment classes worked in a closed area with one teacher. The teachers in the "pod" schools kept the retractable walls closed, and the teacher in the open-area school took her group to a separate room. The class-

room situations for both groups, therefore, were assumed to be comparable and similar.

Instrumentation: Reading. The Bond-Balow-Hoyt New Developmental Reading Test, forms A and B, intermediate level (BBH) measured the student's basic reading vocabulary as well as his ability to read for information, for relationships, for interpretation, and for appreciation. His summed scores on the sections dealing with reading for information and for relationships gave a measure of his literal comprehension ability. His summed scores on the sections dealing with interpretation and appreciation gave a measure of his ability in creative and imaginative reasoning. His summed scores for the last four subtests gave a measure of his level of general comprehension. The BBH subtest scores, therefore, enabled each child to be measured on a variety of skills which might be affected by inquiry training.

The BBH test is a fairly comprehensive test of reading skills (Table 4). Its reliability and validity are stated as proven in the BBH Teacher's Guide (1968, pages 17-19). Reviewers writing in The Seventh Mental Measurements Yearbook (Buros, 1971) agreed that the test is accurate and reliable, and that reading material and item structure are good.

Table 4

Description of Reading Abilities Measured

(BBH *Teacher's Guide*, 1968, p. 18)

A. Basic Reading Vocabulary

1. use phonetic, visual, and structural analysis of words
2. attach meaning to words

B. Reading for Information

1. recall specific terms
2. note important details of information stated
3. recognize fundamental concepts
4. use the facts to answer specific questions

C. Reading for Relationships

1. sense relationships among ideas
2. note ideas which do or do not belong in a group
3. note the order of occurrence

D. Reading for Interpretation

1. recognize the importance of each concept
2. weigh the relative importance of each concept
3. derive inferences, conclusions, and predictions
4. understand the implications of stated ideas

E. Reading for Appreciation

1. sense the feeling tone
2. grasp the sensory impression
3. note the motivations of characters

Instrumentation: Listening. The Sequential Test of Educational Progress: Listening, forms 4A and 4B, intermediate level (STEP) gave a measure of the student's ability to comprehend, interpret, evaluate, and apply what he heard. Details of the listening skills tested are given in Table 5.

Table 5

Description of Listening Abilities Measured
(STEP Teacher's Guide, 1959, p. 42)

A. Literal Comprehension
   1. recognize main ideas
   2. recognize significant details
   3. recognize sequence of ideas

B. Interpretation
   1. understand implications of ideas
   2. understand implications of details
   3. recognize interrelationships among ideas
   4. understand connotative meanings

C. Evaluation and Application
   1. judge validity of ideas
   2. judge sufficiency of details
   3. criticize organization
   4. judge mood and effect
   5. recognize intent

D. General Comprehension (A + B + C)

The STEP test was not a comprehensive test of listening skills; it was, however, the only standardized listening test available for elementary school students. The Technical Report (1957) gave assurances of validity and reliability. Reviewers writing in The Fifth

Mental Measurements Yearbook (Buros, 1959) commented that the test was well-made. They felt, though, that its major limitation was its restriction of listening comprehension to passages requiring less than five minutes of listening time.

Procedures. The design of the research was a pretest-posttest-retention test design based on the pretest-posttest design discussed by Campbell and Stanley (1963, p. 13-25).

R_1	0	X	0	0	(treatment group)
R_2	0		0	0	(control group)

The investigator administered the pretests to both groups between February 23 and March 2, 1973, and the posttests between April 9 and April 19, 1973. The retention tests were administered by the classroom teachers between May 30 and June 19, 1973. All tests were administered during regularly scheduled language arts periods. The posttests were administered at the same time of day and in the same order as the pretests. The protocol provided in the manuals accompanying the tests was followed for each testing session. Every attempt was made to maintain identical testing conditions during the testing periods. The retention tests were also administered during the regularly scheduled language arts periods at the same time of day and in the same order as the previous tests. Identical protocols were followed, and the listening test was tape-recorded by the investigator for identical replay to all classes. It was, therefore, assumed that equivalence was maintained during the three testing sessions.

The treatment consisted of 25 forty-minute lessons on questioning techniques prepared by the investigator. The three classroom teachers in the treatment group administered one lesson per day. Because of professional days and parent conferences, the 25 lessons took up to 29 days to complete. All lessons for the three classes were completed between March 5 and April 12, 1973. No additional time was devoted to language arts during the experimental programme. The three classroom teachers in the control group continued with their regular language arts programme.

Data analysis. The data were analyzed to determine the effect of the training upon the following reading and listening skills:

1. basic vocabulary
2. reading for information
3. reading for relationships between ideas
4. reading for interpretation of material
5. reading for appreciation of material
6. literal comprehension of reading material
7. creative and imaginative reasoning (reading)
8. general reading comprehension
9. literal comprehension of listening material
10. listening for interpretation of material
11. listening for appreciation and evaluation of material
12. general listening comprehension

Since the one-way analyses of variance revealed initial significant differences between the groups in pretest achievement, despite the attempt to control for these differences through randomization procedures, the data were subjected to analysis of covariance (Appendix:

Table C). Two factors operate in analysis of covariance: a) the extent and direction of the difference, and b) the correlation between pre-measures and post-measures (Ferguson, 1971). Both factors are examined in Chapter IV. The significance of the differences between the means within the two groups was determined by correlated t tests and probabilities were computed for them. Correlation coefficients indicating the extent of the relationship among the reading and listening skills measured also were computed, and the probability of alpha error set at .05.

Summary

The design of this study was ordered so as to permit measurement to be taken of the possible effects of inquiry training on reading and listening skills in a language arts context. Since one of the major aims of the school is to enable each student to increase his proficiency in language reception, it was postulated that if inquiry training influenced skill development, it would be an effective teaching strategy; and that pre- and post-scores of subjects would provide an estimate of the efficacy of these lessons over a five-week period.

CHAPTER IV

RESULTS AND DISCUSSION

This chapter discusses the results of the study as they apply to both the general hypothesis and each specific hypothesis. General trends were noted and group differences observed. Confidence limits were set at the .05 level; however, $p \leq .10$ was considered an indication of trend identification.

One-way analysis of variance favoured the treatment group on the mean scores of the pretests in the following measures: basic reading vocabulary ($p \leq .01$), reading for relationships ($p \leq .05$), reading for appreciation ($p \leq .05$), reading for creative reasoning ($p \leq .05$), reading for general comprehension ($p \leq .05$), listening for interpretation ($p \leq .01$), and general listening comprehension ($p \leq .05$) (Appendix: Table C). A slight but not significant difference ($p \leq .10$) also favouring the treatment group was observed for socioeconomic status (SES). SES was indexed with reference to Blishen's (1971) scale which uses occupation as the criterion. Table 6 indicates the differences in SES between the two groups. Overall, the children in the treatment group had a higher SES rating than the children in the control group. This factor may partly account for the fact that initial pretest differences favoured the treatment group. As a result of these significant differences, analyses of covariance using pretest achievement and SES as covariates were applied to the data to adjust the means (Ferguson, 1971).

Table 6

Socioeconomic Status of Sample in Terms of Blishen's (1971) Index.
Percentage of Sample Shown in Each Category

	20.00-29.99	30.00-39.99	40.00-49.99	50.00-59.99	60.00-69.99	70.00-79.99
Control Group						
Boys (N = 35)	22.86	31.43	25.71	20.00		
Girls (N = 31)	12.90	32.26	25.81	22.58	6.45	
Treatment Group						
Boys (N = 28)	14.29	32.14	21.43	10.71	3.57	17.86
Girls (N = 41)	21.95	24.39	24.39	12.20	2.44	14.63

General Hypothesis

The general hypothesis stated that as a result of inquiry training there would be no significant differences between the reading and listening test scores of the treatment and control groups. The general findings of this study indicated that significant differences were not consistent across all subtests. Detailed discussion of specific findings follows.

Hypothesis One

The first hypothesis was concerned with the comparison of both groups on several different measures of reading and listening skill competence. Table 7 presents the analyses of posttest and retention test achievement with pretest achievement and SES partialled out by analyses of covariance.

Significant differences: Treatment group. Significant differences in favour of the treatment group were found in the retention test for literal comprehension in listening ($p \leq .05$) which corresponds to the lowest level of cognition in the Barrett-Clymer taxonomy (1968). Inquiry training was largely oral so it seems logical that it would affect the least complex listening skill first. Listening and reading are considered to be parallel language reception skills, but it should be remembered that listening skill development precedes reading skill development and that, at the grade five level, most children learn more through listening than through reading (Taylor, 1964).

Trends: Treatment group. An indication of a trend favouring the treatment group was noted for the following listening skills: posttest literal comprehension and retention test interpretation and general comprehension. Following the Barrett-Clymer (1968) taxonomy, these cognitive skills come next in degree of complexity. Evaluation and application are at a higher, still more complex level, and showed no effect from the treatment.

Table 7

Analyses of Covariance of the Effects of Inquiry Training upon Reading and Listening Skills: Treatment (N = 69) and Control (N = 66) Groups (df = 1/132)

	Pretest/SES as Covariates Posttest as Criterion				Pretest/SES as Covariates Retention Test as Criterion			
	Adjusted Means				Adjusted Means			
	Treatment	Control	F	P	Treatment	Control	F	P
Reading								
1. Vocabulary	22.15	24.03	3.41	.07†	29.38	32.39	5.43	.02*
2. Information	14.66	15.10	.28	.60	14.34	13.10	1.64	.20
3. Relationships	10.64	9.94	.88	.35	12.25	12.76	.44	.51
4. Interpretation	9.04	10.26	2.96	.09†	10.43	11.30	1.08	.30
5. Appreciation	10.99	12.32	2.61	.11	13.08	14.02	.85	.39
6. Literal Comprehension	25.21	25.13	.01	.93	26.44	26.00	.11	.74
7. Creative Reasoning	19.89	22.72	5.74	.02*	23.28	25.45	2.30	.13
8. General Comprehension	44.84	48.12	3.74	.06†	49.38	51.80	1.16	.28
Listening								
9. Literal Comprehension	21.60	20.76	2.36	.13	25.26	24.11	4.12	.04*
10. Interpretation	26.42	26.55	.04	.83	22.29	21.48	2.09	.15
11. Evaluation & Application	11.48	11.52	.01	.92	13.14	12.76	.80	.37
12. General Comprehension	56.67	56.41	.06	.81	60.40	58.61	2.59	.11

† $p \leq .10$

* $p \leq .05$

Significant differences: Control group. Significant differences ($p \leq .05$) favouring the control group were found in posttest creative reasoning scores (reading) and in retention test vocabulary scores (reading).

Examination of the table reveals that the control group showed continuing improvement in basic vocabulary growth over the treatment group. However, comparable growth was not maintained for any of the comprehension skills. Although results consistently favoured the control group, differences decreased in reading for creative and imaginative reasoning. This test examined each child's ability to think about the material he had read, visualize the setting, respond to the characters, and sense implications. The score consisted of the summed scores of the sections on interpretation and appreciation, neither of which showed significant differences on the retention test, although both showed trends favouring the control group on the posttest. Improved achievement in the skills of interpretation and appreciation required increased ability to a) infer, conclude, predict, and evaluate reading material; b) become more able to think critically and attend to detail; and c) make creative and imaginative responses to reading material through the development of sensory impressions. These skills may well have been specifically taught. The teachers were given the pretest results in March, 1973, and they indicated they planned to use them for diagnosis and remediation of reading weakness. The treatment teachers may not have done so since their pretest results revealed no specific weaknesses in comparison with the control group. It should be remembered that the regular language arts programme makes allowance

for diagnosis and treatment of reading problems. It is possible also that the time of testing affected the results. During the study, pretests were administered at mid-term shortly before parent-teacher conferences; posttests were given in April just before the Easter vacation; and retention tests were completed in June, just before the final reporting period.

Trends: Control group. A trend ($p \leq .10$) favouring the control group was noted for the following posttest reading measures: basic vocabulary, reading for interpretation and appreciation, and general reading comprehension. An indication of a trend favouring the control group was also noted for the retention test reading measure for creative reasoning. The trends observed for the posttest reading scores in interpretation, appreciation, and general comprehension disappeared on the retention test. Perhaps improved posttest scores resulted in the cessation of remediation for the control group. Possibly the treatment group was given remediation as a result of the measured loss of achievement between pretest and posttest. Or the treatment may have had a delayed positive effect on the skills measured on the retention test.

Correlations between pre-measures and post-measures. The first factor operating in analysis of covariance has been discussed: the extent and direction of the differences between the means of the two groups on posttest and retention test criterion measures. The second factor operating in analysis of covariance may be observed in Table 8 which presents the correlations between pre-measures and post-measures. All correlations are significant at the .01 level of confidence. Using

Table 8

Correlations Between Pretests, Posttests, and Retention Tests of the BBH Reading Test and STEP Listening Test

	Reading								Listening			
	Vocabulary	Information	Relationships	Interpretation	Appreciation	Literal Comprehension	Creative Reasoning	General Comprehension	Literal Comprehension	Interpretation	Evaluation & Application	General Comprehension
Control (df = 64)*												
Pretest/Posttest	.769	.493	.478	.650	.594	.668	.749	.838	.604	.614	.567	.808
Pretest/Retention Test	.747	.563	.589	.656	.485	.726	.732	.837	.658	.715	.735	.848
Posttest/Retention Test	.781	.530	.509	.525	.670	.708	.748	.857	.616	.672	.633	.791
Treatment (df = 67)**												
Pretest/Posttest	.740	.510	.533	.433	.597	.674	.644	.785	.604	.657	.610	.773
Pretest/Retention Test	.772	.576	.664	.484	.664	.719	.709	.785	.603	.708	.622	.773
Posttest/Retention Test	.833	.522	.631	.356	.695	.739	.680	.801	.696	.742	.693	.843

* α = .05 (r = .243)
  α = .01 (r = .315)

** α = .05 (r = .238)
   α = .01 (r = .307)

r = .400 as criterion (Garrett, 1962), no marked differences were noted between correlations. The observed variations between testing periods may have resulted from the delayed effect of the treatment, from a shift in emphasis in instruction, or from the effect of test conditions.

Decision. Hypothesis 1, is rejected for these measures: reading for creative reasoning, basic reading vocabulary, and listening for literal comprehension. It is not rejected for these measures: reading for information, relationships, interpretation, and appreciation; literal and general reading comprehension; listening for interpretation, appreciation and evaluation; general listening comprehension.

Hypothesis Two

The second hypothesis stated that there would be no significant differences between pre, post, and retention measures within the control group. The means and standard deviations for these measures are reported in Table 9. The significance of the differences between these means was determined by correlated *t* tests and probabilities were computed. The findings are reported in Table 10.

Comparisons between pretest and posttest. These comparisons indicate a significant loss in achievement in basic reading vocabulary ($p \leq .01$); and in these listening skills: literal comprehension ($p \leq .01$), evaluation and application ($p \leq .05$), and general comprehension ($p \leq .01$). Significant gains were noted for listening for interpretation ($p \leq .01$); and for all other reading skills ($p \leq .05$) except

Table 9

Means and Standard Deviations for the Pretests, Posttests, and Retention Tests of the BBH Reading Test and the STEP Listening Test: Control and Treatment Groups

	Control*						Treatment**					
	Pretest		Posttest		Retention Test		Pretest		Posttest		Retention Test	
	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd	$\bar{x}$	sd
Reading												
1. Vocabulary	26.46	10.30	22.50	7.88	30.26	10.29	30.91	10.29	23.61	9.40	31.42	12.62
2. Information	11.42	5.46	14.89	4.90	12.88	6.76	11.73	6.52	14.86	6.11	14.55	6.65
3. Relationships	9.88	4.37	9.33	4.59	12.00	4.85	11.57	5.04	11.22	5.43	12.99	6.38
4. Interpretation	8.65	4.76	9.83	4.49	10.74	5.45	10.29	5.96	9.45	4.84	10.97	5.93
5. Appreciation	9.94	5.77	11.47	5.40	13.02	6.32	12.59	6.72	11.80	6.31	14.04	7.92
6. Literal Comprehension	21.30	8.71	24.23	8.35	24.97	9.71	23.29	10.09	26.07	10.03	27.42	11.93
7. Creative Reasoning	18.59	9.22	21.30	8.52	23.64	10.74	22.88	11.58	21.25	9.84	25.01	12.35
8. General Comprehension	39.89	16.26	45.53	15.01	48.61	19.04	46.17	19.78	47.32	17.90	52.44	23.27
Listening												
9. Literal Comprehension	25.05	3.37	20.53	3.91	23.86	3.99	25.51	3.02	21.81	3.88	25.49	4.26
10. Interpretation	20.29	4.09	25.74	5.09	20.73	4.57	22.22	4.11	27.19	4.97	23.01	4.23
11. Evaluation & Application	11.99	3.20	11.26	2.44	12.42	3.29	12.83	2.84	11.73	2.89	13.46	3.19
12. General Comprehension	57.35	9.11	54.92	9.37	57.02	10.70	60.58	8.96	58.09	9.90	61.93	10.57

* N = 66
** N = 69

Table 10

Correlated t tests for the BBH Reading Test and the STEP Listening Test: Control Group (N = 66; df = 65).

	Pretest with Posttest		Pretest with Retention Test		Posttest with Retention Test	
	t test	p	t test	p	t test	p
Reading						
1. Vocabulary	-4.84	0.00**	4.19	0.00**	9.72	0.00**
2. Information	5.34	0.00**	2.01	0.05*	-2.76	0.01**
3. Relationships	-0.96	0.34	4.07	0.00**	4.59	0.00**
4. Interpretation	2.46	0.02*	3.94	0.00**	1.49	0.14
5. Appreciation	2.45	0.02*	4.03	0.00**	2.58	0.01**
6. Literal Comprehension	3.39	0.00**	4.30	0.00**	0.85	0.40
7. Creative Reasoning	3.46	0.00**	5.47	0.00**	2.64	0.01**
8. General Comprehension	5.06	0.00**	6.73	0.00**	2.51	0.02*
Listening						
9. Literal Comprehension	-11.11	0.00**	-3.08	0.00**	7.76	0.00**
10. Interpretation	10.65	0.00**	1.07	0.29	-10.26	0.00**
11. Evaluation and Application	-2.16	0.03*	1.50	0.14	3.66	0.00**
12. General Comprehension	-3.41	0.00**	-0.47	0.64	2.55	0.01**

* $p \leq .05$
** $p \leq .01$

reading for relationships (n.s.).

Comparisons between pretest and retention test.

Between pretest and retention test, there were significant gains across all measures of reading ability ($p \leq .05$). No significant differences were observed for listening skill development, except for literal comprehension ($p \leq .01$) which showed a significant loss; however, an indication of a trend was noted in listening for evaluation and application.

Comparisons between posttest and retention test.

Comparisons between posttests and retention tests revealed significant gains in these reading skills: basic vocabulary ($p \leq .01$), reading for relationships, appreciation, and creative reasoning ($p \leq .01$), and general comprehension ($p \leq .05$). An indication of a trend was observed in reading for interpretation. Significant gains were also noted in listening for literal comprehension, evaluation and application, and in general comprehension ($p \leq .01$). A significant drop in achievement was observed for only two skills: reading for information ($p \leq .01$) and listening for interpretation ($p \leq .01$).

Summary

Table 11 gives a summary of the within group differences observed during the three testing periods. Examination of this table shows that the control group maintained a consistent level of significant growth in achievement in reading for creative reasoning; and significant improvement across all tests in reading for appreciation and for general comprehension. However, analyses of the listening test results and all other reading results indicated no consistent growth patterns. This random pattern may have been the result of various factors. The significant loss in achievement noted between pretest and posttest may have been due to the time of testing which occurred just before the Easter vacation when the drive to achieve may have decreased. Significant losses between posttest and retention test may be explained by the fact that, in reading for information, the children possibly reached their optimal level on the posttest. However, the significant loss noted in listening for interpretation is more likely to have occurred as a result of the retention test's being tape-recorded. Interpretation skill development in listening is probably influenced by the total speech package of paralinguistics (tone of voice, tempo, etc.) and kinesics (hand gestures, raised eyebrows, shrugs, changes in stance, etc.) (Pei, 1966). It may be that for the purpose of measuring the ability to understand implications of ideas and details, to recognize interrelationships among ideas, and to understand connotative meanings, tape-recorded listening tests are inadequate, since only part of the message is being received.

Table 11

Summary Statement of Significant Within Group Differences for the BBH Reading Test and the STEP Listening Test: Pretests, Posttests, and Retention Tests.

		Reading								Listening			
		Vocabulary	Information	Relationships	Interpretation	Appreciation	Literal Comprehension	Creative Reasoning	General Comprehension	Literal Comprehension	Interpretation	Evaluation and Application	General Comprehension
Control (N = 66)	Pre/Post	−**	+**	0	+*	+*	+**	+**	+**	−**	+**	−*	−**
	Pre/ Retention	+**	+*	+**	+**	+**	+**	+**	+**	−**	0	0	0
	Post/ Retention	+**	−**	+**	0	+**	0	+**	+*	+**	−**	+**	+**
Treatment (N = 69)	Pre/Post	−**	+**	0	0	0	+**	0	0	−**	+**	−**	−**
	Pre/ Retention	0	+**	+*	0	+*	+**	0	+**	0	+*	+*	0
	Post/ Retention	+**	0	+**	+*	+**	0	+**	+**	+**	−**	+**	+**

\+ significant gain in achievement

\- significant loss in achievement

0 no significant difference

* $p \leq .05$

** $p \leq .01$

Decision. The differences recorded in these tables are inconsistent in degree and direction; nevertheless, they reveal a differing level of achievement across all measures during the three testing periods. Hypothesis 2, therefore, is rejected.

Hypothesis Three

The third hypothesis stated that there would be no significant differences between pre, post, and retention measures within the treatment group. The means and standard deviations across all tests are reported in Table 9. Analyses by correlated *t* tests of the differences between these means are reported in Table 12.

Comparisons between pretest and posttest. Comparisons between pretest and posttest show significant gains in the following measures: reading for information and for literal comprehension, and listening for interpretation ($p \leq .01$). A significant loss was observed for basic reading vocabulary and all other listening scores ($p \leq .01$).

Comparisons between pretest and retention test. No significant loss of achievement was observed between pretest and retention test. Significant gains were reported for these measures: reading for information ($p \leq .01$) relationships ($p \leq .05$), appreciation ($p \leq .05$), literal comprehension ($p \leq .01$), and general comprehension ($p \leq .01$). Significant gains were also observed for these measures of listening ability: interpretation ($p \leq .05$), and evaluation and application ($p \leq .05$). A trend towards increased skill in reading for creative reasoning and in general listening comprehension was also noted.

Table 12

Correlated t tests for the BBH Reading Test and the STEP Listening Test: Treatment Group (N = 69; df = 68)

	Pretest with Posttest		Pretest with Retention Test		Posttest with Retention Test	
	t test	p	t test	p	t test	p
Reading						
1. Vocabulary	-8.42	0.00**	0.52	0.60	9.12	0.00**
2. Information	4.12	0.00**	3.84	0.00**	-0.40	0.69
3. Relationships	-0.57	0.57	2.42	0.02*	2.84	0.01**
4. Interpretation	-1.19	0.24	0.93	0.36	2.03	0.05*
5. Appreciation	-1.12	0.27	1.96	0.05*	3.22	0.00**
6. Literal Comprehension	2.83	0.01**	4.04	0.00**	1.37	0.18
7. Creative Reasoning	-1.47	0.15	1.92	0.06†	3.39	0.00**
8. General Comprehension	0.76	0.45	3.56	0.00**	3.03	0.00**
Listening						
9. Literal Comprehension	-9.62	0.00**	-0.04	0.97	9.51	0.00**
10. Interpretation	10.67	0.00**	2.06	0.04*	-10.19	0.00**
11. Evaluation and Application	-3.59	0.00**	1.99	0.05*	5.98	0.00**
12. General Comprehension	-3.21	0.00**	1.65	0.10†	5.49	0.00**

† $p \leq .10$

* $p \leq .05$ ** $p \leq .01$

Comparisons between posttest and retention test. Comparisons between posttest and retention test revealed significant gains in all reading measures at the .01 level of confidence, except in interpretation ($p \leq .05$), and in information and literal comprehension (n.s.). All listening skills showed a significant gain ($p \leq .01$) except for interpretation which showed a significant loss ($p \leq .01$).

Summary. The inconsistent findings, as shown in these tables, may have been the result of a) teacher variability, b) ceiling effect, or c) test conditions, as was posited for Hypothesis 2, or d) they may have resulted from the diverse approach developed in the unit. The children were purposely introduced to inquiry in several contexts so that they might become aware of various strategies and techniques of questioning.

Table 10 gives a summary statement of the within group differences. No regular pattern of achievement was readily discernible; however, more significant gains were noted between posttest and retention test than between the other testing periods; and fewer significant losses were noted between pretest and retention test than between the other testing periods.

Decision. The effect of the treatment was not consistent in degree or direction; nevertheless, since there were significant differences in achievement across all measures, Hypothesis 3 is rejected.

<u>Correlation Analysis</u>

This analysis was conducted to ascertain the extent of the relationships among the reading and listening skills measured. A correlation matrix was computed and the critical values of the correlation coefficients determined (Ferguson, 1971, Table F).

Coefficients ranging from ± .200 to ± .400 may be described as low correlation, ± .400 to ± .700, substantial or marked correlation, ± .700 to ± 1.000 high correlation (Garrett, 1962). Most of the correlations for both groups were either substantial or high.

<u>For each testing period: Treatment group</u>. Correlations for this group were significant beyond the .05 level of confidence (Appendix: Tables D,E,F). Coefficients ranged from .259 to .960. These findings support the assumption that the measured reading and listening subskills were related to each other.

<u>For each testing period: Control group</u>. All correlations for the control group were significant beyond the .01 level of confidence (Appendix: Tables G,H,I). Coefficients ranged from .322 to .938. These findings also tend to affirm the postulated relationship between reading and listening.

<u>Across testing periods: Treatment group</u>. Correlations between the subskills of the BBH reading test and the STEP listening test across all testing periods were computed and recorded in the Appendix: Tables J and K. For the treatment group, most of the correlations were substantial but not high. They ranged from .211 to .703. Non-significant

results at the .05 level of confidence (r = .238) were observed between the post reading test for interpretation and the retention listening test for literal comprehension; and between the post reading test for interpretation and the retention listening test for evaluation and application. All other correlations were significant. The highest correlation (r = .703) was between the pre reading test for general comprehension and the post listening test for general comprehension.

The two non-significant correlations were between tests which measure different language reception skills used for different purposes. The highest correlation, however, was between two general reception skills similar in purpose to each other.

Across testing periods: Control group. The range of correlation coefficients for the control group was from .243 - .737. All results were significant at the .05 level of confidence (r = .243). The following correlations greater than .700 were noted for the control group: post reading test for general comprehension with post listening test for general comprehension (r = .737); post reading test for creative reasoning with post listening test for general comprehension (r = .737); retention reading test for interpretation with retention listening test for general comprehension (r = .717); retention reading test for creative reasoning with post listening test for general comprehension (r = .701).

These findings suggest that competence in general listening comprehension is linked with competence in reading for interpretation, reasoning, and literal comprehension. All these skills have a similar purpose: to understand and interpret to some degree, information

being received. A close relationship between them therefore, would be expected. No marked differences among correlations were observed for either group. All coefficients were relatively consistent from test to test, showing differences of less than .400 (Garrett, 1962).

Summary

Results of the study indicated that significant differences were not consistent across all subtests; however, analyses of covariance revealed some growth in listening and reading. Significant gains were made by the treatment group between the pretest and the retention test in literal comprehension (listening); no significant gains were found between the pretest and the posttest. Significant gains were made by the control group between the pretest and the posttest in creative reasoning (reading); and between the pretest and the retention test in basic vocabulary (reading).

Analyses by correlated _t_ tests which measured the significance of the differences between the means for different testing periods within each group indicated random patterns of growth for both groups.

Correlation analyses affirmed the existence of a substantial positive relationship among the measured listening and reading skills.

CHAPTER V

CONCLUSION

The present study represented an attempt to examine empirically the effect of inquiry training on reading and listening skill development.

The sample used consisted of six classes of heterogeneously grouped grade five students, 135 children in all, randomly selected from the heterogeneously grouped population of grade five students in Delta, British Columbia, and randomly assigned to one of two groups: treatment or control.

The Bond-Balow-Hoyt New Developmental Reading Test and the Sequential Test of Educational Progress: Listening, were administered to the children in February, April, and June, 1973. The treatment group studied a unit of 25 forty-minute lessons on inquiry strategies during March and April, 1973.

Initial one-way analysis of variance revealed discrepancies between the groups in pretest achievement and socioeconomic status. The data, therefore, were analyzed by analyses of covariance, using pretest achievement and socioeconomic status as covariates. Correlated t tests were used to analyze the significance of the within group differences between means across all measures. A correlation matrix was computed to determine the extent of the relationships among the measured listening and reading subskills.

Results indicated that although treatment had a positive effect, significant differences were not consistent across all subtests between groups; that significant differences inconsistent in degree and direction were present within each group; and that there was a

substantial positive relationship between reading and listening.

The present chapter examines the results in relation to the theoretical framework of the study and draws conclusions concerning the effect of the treatment on test behaviour. A discussion of the limitations of the study is followed by a review of possible implications for classroom teaching and further research.

Theoretical Process of Inquiry

The theoretical framework for this study postulated that the ability to use language for inquiry purposes was contingent upon perception of stimuli and upon arousal and consequent reduction of conceptual conflict. These factors are now considered in relation to the observed results.

Perception of stimuli. Perception of stimuli was considered to be dependent upon the nature of the stimuli and the nature of the learner. In this study, the stimuli used in the oral situations may have induced more inquiry than those used in the written situations, since question-asking may have been more stimulated by concrete objects, games, and role play than by written discourse. If the children did not perceive the written stimuli as having at least one of the qualities of discrepancy, novelty, surprise, complexity, ambiguity, or incongruity, they may have ignored them. Conversely, if they perceived the written materials as being very unusual, they may have rejected them. In either case, avoidance would have precluded inquiry. As the results of the study tend to indicate, the stimuli presented in the oral context may have encouraged increased growth in listening (Table 7).

Treatment was structured to focus the child's attention on the stimulus device. His willingness to explore it, however, was dependent upon his cultural heritage, extent of curiosity, level of learning, and mind set. It may be that these variables affected each child differently in different inquiry situations, and that the interaction of these variables influenced individual awareness of the stimulus. In particular, posttest achievement may have been somewhat affected by a mind set directed more towards the imminent Easter vacations than the examinations. As Table 11 indicates, there were more significant losses for both groups between the pretest and posttest than there were between the other testing periods.

Conceptual conflict. It is possible that arousal of conceptual conflict and its consequent reduction also may have been more reinforcing in a listening than in a reading context. Conflict reduction requires the resolution of doubt, perplexity, irrelevance, confusion, contradiction, or incongruity. Since thinking and questioning when reading are perhaps more difficult cognitive processes than thinking and questioning when listening, interaction among the students in the oral-aural situation may have led to more immediate conflict reduction than interaction between the author and the reader in the writing-reading situation. The common sequence of inquiry is to a) ask, b) listen, and then, if necessary, c) read. Children appear to prefer to get their information directly from live sources. Obtaining information from books is a learned and fairly sophisticated strategy. The act of approaching printed material with their own questions in mind might, therefore, have been an unusual experience. While they

might have enjoyed doing it during the lessons, they might not have considered it to be a useful endeavour on a test. Alternatively, they might have approached the test with questions in mind; and being inexperienced in their use of inquiry techniques have used them inappropriately. The results of this study give a measure of support to this conclusion. With initial differences partialled out by analyses of covariance, the adjusted mean scores on pre-post reading measures for the treatment groups showed a significant decrease when compared with the control group results in reading for creative reasoning (Table 7). Indications of a trend towards decreased achievement were also noted in basic reading vocabulary, and in reading for interpretation and general comprehension. However, comparisons between the groups on pre/post listening measures did not reveal the same trend.

Effect of Treatment

There was a significant increase in achievement in listening for literal comprehension, a set of skills which is described in the STEP Listening: Manual for Interpreting Scores (1957, p. 9) as follows:

> Plain-sense comprehension
> a. Identifying main ideas (e.g. selecting a suitable title or a correct statement of the central theme of "listened to" material).
> b. Remembering significant details.
> c. Remembering simple sequences of ideas.
> d. Understanding denotative meanings of important words.

The ability to perform these tasks is prerequisite to the more complex cognitive behaviours of interpretation, evaluation and application. It may be concluded, therefore, that a) the inquiry training increased

achievement in the least complex cognitive behaviour first, b) the results indicated a trend towards increased achievement at the next level of complexity: interpretation, and c) the training did not influence the most complex behaviours: evaluation and application.

Inquiry training, therefore, may have encouraged increased use of what Thorn (6:11) called the time differential (the difference between thinking rate and listening rate) for the purpose of manipulating ideas while assimilating information. It is logical to assume that, as with language acquisition, manipulation of ideas also proceeds from simple to complex. Had the period of inquiry training been longer, manipulation of ideas might have reached a more complex level. It is possible, also, that since the instruments measured only selected skills (Table 13), the total effect of training was not tested.

A similar trend was not observed for reading, perhaps because at the grade five level, in terms of word recognition rate and thinking rate, reading is less efficient, more difficult, and slower than listening (Taylor, 1964). It would seem to follow that since reading may be more difficult than listening, it would be less readily affected by the process of inquiry than listening. The implications of the findings related to the first hypothesis (Table 7) tend to support this statement. It may be that in a short exploratory study such as this, certain reading processes are inhibited or restricted by inquiry. A longer training period might permit assimilation of inquiry strategies and the development of controlled inquiry techniques might then affect reading skill development.

Table 13

A Comparison of the Skills Presented during Inquiry Training as Described in the Barrett-Clymer Taxonomy (1968) with the Skills Measured by the BBH Reading Test and the STEP Listening Test.

Barrett-Clymer Taxonomy	BBH Test*	STEP Test**
Literal Comprehension		
details	x	x
main ideas	x	x
sequence of ideas	x	x
comparison of ideas	x	x
cause/effect	x	x
character traits	x	x
Reorganization		
classifying	x	x
outlining	-	-
summarizing	-	-
synthesizing	-	-
Inferential Comprehension		
details	x	x
main ideas	x	x
sequence	x	x
comparisons	x	x
cause/effect	x	x
character traits	x	x
predict outcomes	x	x
interpret figurative language	x	x
Evaluation		
reality or fantasy	x	x
fact or opinion	x	x
adequacy and validity	x	x
appropriateness	-	-
worth, desirability	-	-
Appreciation		
emotional response	x	x
identification with character	-	-
reaction to craftsmanship	-	-
sensory reaction	x	x

* This analysis is derived from information in the BBH Teacher's Guide, 1968. For skill descriptions, see Table 4.

**This information is derived from information in the STEP Teacher's Guide, 1959. For skill descriptions, see Table 5.

x skill measured   - skill not measured

A second reason for the differential effect of inquiry upon listening and reading skills may have related to the fact that inquiry training may have been more closely allied with listening test behaviour than with reading test behaviour. The unit activities were mainly oral: discussion, conversation, dialogue. Many were tape-recorded for question evaluation during class. This emphasis on oral-aural activities may explain, in part, increased achievement in listening over reading.

A third factor relating to the observed decrease in reading achievement by the treatment group concerns the epistemic and critical questioning strategies presented in this unit which were based on the SQ3R (survey, question, read, review, recite) approach developed by Science Research Associates (1958). This approach has been criticized by Spache and Spache (1969) on the grounds that setting questions previous to reading may restrict comprehension. For example, if a student reads to get the main idea of a selection, he may not read to locate details, make judgements, note figurative language, etc. An inexpert questioner, therefore, may set himself the wrong kind of question, inhibiting comprehension of the passage. It is possible also that the children participating in this study did not have time enough to develop meaningful sequences of questions which would have enabled them to probe more deeply into the material they were examining.

Limiting Factors

Instrumentation. The degree of complexity posited in the Barrett-Clymer (1968) taxonomy of cognitive and affective behaviours ranged from literal comprehension through reorganization, inferential

comprehension, evaluation, and appreciation. These categories and the tasks within them were ordered from easy to difficult in terms of the cognitive requirements needed for each one. This orderly presentation provides, perhaps, an overly precise description of skills which does not account for the overlap present in certain types of questions; nevertheless, it is a useful point-of-reference for a discussion of the effect of treatment and the measurement of that effect. These behaviours are summarized with reference to this study in Table 13. It would appear that the BBH test measured comprehensively the cognitive tasks subsumed under literal and inferential comprehension, but that the more complex reorganization, evaluation, and appreciation tasks which also may have been affected by inquiry training were not as adequately tested. Measuring the effect of inquiry on reading comprehension skills by using a standardized reading test, therefore, may have been inappropriate. The efficacy of reading comprehension tests themselves has been questioned. Spache and Spache (1969) contended that test construction experts are confused as to the nature of reading comprehension and its measurement.

> Reading tests tend to claim to measure skills which experts cannot show to exist. Test scores bear little or no relationship to most of the major components of comprehension, if indeed they actually measure anything more than sophistication in taking tests and the reader's information background. Reading tests fail to assess the abilities to organize, synthesize, or apply the facts read, or, in other words, any of the really useful aspects or long-range values of reading ability (Spache & Spache, 1969, p. 462).

The STEP listening test appeared to measure the same cognitive and affective functions as the BBH test; the substantial correlations

observed between the two instruments lend a degree of support to this statement (Appendix: Tables J, K). However, two additional criticisms of the STEP test may be made. The selections were unrealistically brief, ranging in recommended reading time from thirty seconds to three minutes and forty seconds. Also, the effect of kinesics and paralinguistics on listening ability was not measured. It would seem, therefore, that although both these tests gave an indication of the child's ability to understand and reason, they were inadequate in measuring the more complex cognitive tasks described in the Barrett-Clymer (1968) taxonomy. The need for an appropriate instrument is evident.

Extent of training period. The training period was probably too brief to affect significantly all the listening and reading skills tested. Inquiry involves many complex cognitive skills, and its strategies require practice. The children in this study had an opportunity to explore question-asking in a variety of contexts which permitted introduction to many techniques of inquiry used in language arts but did not allow enough time for proficiency to develop fully. Skill development in language tends to proceed from fluency to control. A child learns a new concept or principle and applies it generally, whether or not it is appropriate. For example, as the children learned to play the yes/no questioning games, they became fascinated with the power of constraint-seeking questions; and frequently, rather than ask the obvious hypothesis-testing question to elicit an affirmative response, they continued unnecessarily to narrow the field of inquiry by asking superficial constraint-seeking questions. After

they had become fluent questioners in this context, they tended to control their questioning behaviour. However, there may not have been time for control to develop for the more sophisticated questioning strategies. Effective inquiry requires time: time for the teacher to ask challenging questions, time for the student to ask questions of the teacher and other students, time for the student to formulate criteria for good questioning. In short, time is needed for the development of a critical, inquiring, active mind set, especially during reading lessons where children traditionally have given passive responses to trivial questions.

Test conditions. Although every attempt was made to maintain identical testing conditions during the three testing periods, external influences may have influenced the validity of the results. The posttests were administered just before the Easter vacation when the children may not have been as highly motivated to achieve as they had been in February or would be in June. It may be, therefore, that much of the variability noted in the posttest results was seasonal.

The validity of the retention test results in listening for interpretation may also be questioned since the test was tape-recorded instead of being directly administered as were the pretest and posttest. It may be that the development of interpretation skills in listening is influenced considerably by paralinguistics (tone, tempo, diction) and kinesics (gestures, stance, manner), which were not present in the tape-recorded test.

It was observed (Table 11) that the control group scored significantly higher between pretest and posttest on seven subtests and

significantly lower on four subtests. Between pretest and retention test they scored significantly higher on eight subtests and significantly lower on one subtest; and between posttest and retention test they made eight significant gains and two significant losses. The treatment group scored significantly higher between pretest and posttest on three subtests and significantly lower on four subtests. However, between pretest and retention test, there were seven significant gains and no significant losses in achievement; and between posttest and retention test, they made nine significant gains; the only significant loss was in listening for interpretation, probably due to the tape-recording of the test. From these results, it may be seen that achievement in listening between the post-retention period showed a marked improvement over the pre-post period, as did achievement in basic reading vocabulary.

Since homegeneity of variance between the two groups cannot be assumed (Appendix: Table C), valid comparisons of these within group differences cannot be drawn. However, observations and speculations may be made. a) The children in both groups may have received additional instruction in reading and listening skill development. b) They may have developed a degree of test sophistication. c) Test conditions may have been more favourable during the retention test period than during the posttest period. d) It may have taken a period of time for the treatment to affect listening skill development since growth in listening appeared after the treatment between posttest and retention test. Inconsistent achievement for reading may have been due to similar reasons.

Teacher variable. The teacher variable should also be considered in an examination of the effect of the inquiry training. In this study, no measure was taken of the teachers' questioning ability prior to the study. Although the lessons were highly structured, indicating precisely the strategies to be used, no in-service training in inquiry techniques was provided for the teachers. Research indicates that most teachers need to learn how to ask meaningful sequences of questions, especially at the more complex cognitive levels. Guszak (1967) found that teachers question largely for recall, and seldom for evaluation, inference, or appreciation. He concluded that children's cognitive growth may well be inhibited by teachers' emphasis on trivia. Taba (1965) suggested that if teachers followed a general three-step sequence in question asking: focussing thinking on facts or ideas presented, extending thinking to include many children, and then raising the questioning level to include judgements, generalizations, and inferences, children might develop more complex thought processes.

Correlation between Reading and Listening

The substantial correlations observed for most of the reading and listening subskills measured by the BBH and STEP tests tend to affirm the postulated existence of a relationship between these two language reception skills (Appendix: Tables D-K). However, this overall marked correlation does not imply a causal relationship.

The highest correlation noted for the treatment group was between the reading pretest for general comprehension and the listening posttest for general comprehension ($r = .703$) (Appendix:

Table J). This correlation indicated that 49% of the variance of general reading comprehension could be accounted for by the variance of general listening comprehension.

The highest correlations noted for the control group were between the reading posttest for general comprehension and the listening posttest for general comprehension; and between the reading posttest for creative reasoning and the listening posttest for general comprehension ($r = .737$) (Appendix: Table K). These correlations indicated that 54% of the variance of reading for general comprehension or for creative reasoning could be accounted for by the variance of general listening comprehension.

Implications

On the basis of the results of this study, there appear to be several implications for the language arts teacher. These include:

1. experimentation with various questioning strategies during reading lessons to ascertain which are the more effective in encouraging growth at all levels of the Barrett-Clymer (1968) taxonomy, but especially at the levels of reorganization, inferential comprehension, evaluation, and appreciation

2. playing a variety of questioning games in order to channel the student's curiosity into intellectual pursuits which may assist the development of strategic thinking, decision making, and problem solving processes

3. critical assessment and selection of materials from the mass media, school texts, and other resources for the purpose of encouraging development by students of such critical questioning

abilities as: evaluation of material; comparison of new information with old; recognition of fact and opinion, reality and fantasy; and determination of the adequacy, validity, appropriateness, worth or desirability of the material

4. inductive presentation of the principles of literature and language through the use of _yes_/_no_ games.

There are also several implications for further research arising from the study. These include:

1. the need to devise an instrument focussing on appropriate cognitive skills which would measure the effect of inquiry training and determine its worth in a language arts context

2. the need to devise reading materials that use inquiry strategies as a basis for developing comprehension at all levels of the Barrett-Clymer (1968) taxonomy

3. the need to ascertain the relationship of socio-economic status and intelligence to inquiry behaviour

4. the need to determine the effect of long-term, skill-specific training upon listening and reading skill development (for example: the use of _yes_/_no_ games in different language arts contexts, the use of epistemic questions in oral interviews, the use of suppositional questions in literature, etc.)

5. the need to ascertain the effect that teachers skilled in questioning strategies have upon children's inquiry practices and consequently upon their reading and listening skills

6. the need to determine the interactive and reinforcing potentialities of conflict arousal and reduction with inquiry processes

and language reception skills

7. the need to determine the degree of complexity of children's questions in both reading and listening contexts in order to ascertain the preferred context for introduction of and instruction in inquiry techniques

8. the need to determine methods of teaching children how to ask appropriate questions: suppositional, epistemic, or critical.

Concluding Statement

If inquiry is a mode of behaviour which can be strengthened through the use of specific strategies, as Suchman (1962) suggested, then it should be applicable to many problem areas. First, though, it would appear that inquiry needs to be taught and practised over a long period of time. Short-term, diverse training appears to limit rather than encourage skill development especially in reading. Inquiry skill appears also to be directly related to a particular mode of communication: listening or reading. In this study, the observed increase in listening achievement was possibly due to the oral nature of the learning activities. It would seem, therefore, that increased reading achievement might result from written inquiry activities. The real test of inquiry training, however, is not whether the child can inquire, but whether he does. Since he gains most of his knowledge in all content subjects at school through language (Bruner, 1966), it may be that questioning skill gained in listening and reading in one subject area would be used in another.

It may be that the act of inquiry itself is of value in education. Teachers participating in this study reported that during

the training period, the children demonstrated increased critical awareness, incidental skill learning, and an improved attitude towards language arts. These subjective observations tend to reinforce the contention of Bruner (1960) that inquiry is a highly motivating force for self-directed learning. It may also be that since inquiry skill requires precision in thought, principals and teachers who are skilled question-askers are able to communicate more effectively with each other and with their students than those who are not. A study of the inquiry process may also be of value to the publisher of educational materials. Although there is much current interest in this subject, few inquiry-based materials for either reading or listening are available.

A major concern in education today is the development of intrinsically-motivated, discriminating, self-directed learners. It is of little value for an individual to try to rediscover everything for himself through careful and time-consuming inquiry. What he should be able to do, however, is to isolate those ideas which for some particular purpose require his close attention, and through the use of effective inquiry strategies make his own discoveries about them. In these circumstances, question-asking would play a vital role in self-directed learning.

REFERENCES

Allen, R. V. Asking questions: An essential reading ability. *Claremont reading conference yearbook,* 1969, 33, 94-99.

Armstrong, R. D. The revolution in grammar has just begun. Paper presented at the meeting of the Canadian Council of Teachers of English, Calgary, August, 1972.

Armstrong, R. D., & Evanechko, P. O. A conceptual model for language development. Unpublished mimeographed material, Faculty of Education, University of Victoria, 1973.

Arnmon, P. R. Aspects of speech comprehension by children and adults, USOE, Final Report, Project No. 7-1-114, 1969, ERIC Document 037643.

Aschner, M. J. Asking questions that trigger thinking. *National education association journal,* 1961, 4, 44-46.

Barrett, T. C., & Clymer, T. The Barrett taxonomy: Cognitive and affective dimensions of reading comprehension. In H. M. Robinson (Ed.), *Innovation and change in reading instruction: The sixty-seventh yearbook of the national society for the study of education, part 2.* Chicago: University of Chicago Press, 1968.

Berlyne, D. E. *Structure and direction in thinking.* New York: Wiley, 1965.

Berlyne, D. E. Curiosity and exploration. *Science,* 1966, 153, 25-33.

Berlyne, D. E. Children's reasoning and thinking. In P. H. Mussen (Ed.), *Manual of child psychology.* New York: Wiley, 1970.

Berlyne, D. E. What next? In H. I. Day, D. E. Berlyne, D. E. Hunt (Eds.), *Intrinsic motivation: A new direction in education.* Toronto: Holt, Rinehart and Winston, 1971.

Bernstein, B. Social structure, language, and learning. *Educational research,* 1961, 3, 163-176.

Beswick, D. G. Cognitive process theory of individual differences in curiosity. In H. I. Day, D. E. Berlyne, D. E. Hunt (Eds.), *Intrinsic motivation: A new direction in education.* Toronto: Holt, Rinehart and Winston, 1971.

Beswick, D. G., & Tallmadge, G. K. Reexamination of two learning style studies in the light of the cognitive process theory of curiosity. *Journal of educational psychology,* 1971, 62, 456-462.

Betts, E. A. Reading is thinking. *The reading teacher*, 1961, 25, 179-184.

Blank, S. S., & Covington, M. Inducing children to ask questions in solving problems. *The journal of educational research*, 1965, 59, 21-27.

Blishen, B. R. A socio-economic index for occupations in Canada. In B. R. Blishen, F. E. Jones, K. D. Naegels, & J. Porter (Eds.), *Sociological perspectives*. (abridged ed.) Toronto: Macmillan, 1971.

Bond, G., Balow, I. H., & Hoyt, C. J. *New developmental reading tests: Forms A and B (intermediate)*. Chicago: Lyons & Carnahan, 1968.

Bond, G., Balow, I. H., & Hoyt, C. J. *New developmental reading tests: Teacher's guide*. Chicago: Lyons & Carnahan, 1968.

Bromwich, R. M. The young child's language and effective learning. *Elementary English*, 1972, 49, 826-831.

Brown, L. R. *Imagination and literary theory: Implications for a literature program in the elementary school*. Unpublished doctoral dissertation, University of Alberta, 1971.

Bruner, J. S. *The process of education*. New York: Vintage, 1960.

Bruner, J. S. The act of discovery. *Harvard educational review*, 1961, 31, 21-32.

Bruner, J. S. The course of cognitive growth. *American psychologist*, 1964, 19, 1-14.

Bruner, J. S. *Toward a theory of instruction*. Cambridge, Mass.: Harvard University Press, 1966.

Bruner, J. S., Olver, R. R., & Greenfield, P. M. *Studies in cognitive growth*. New York: Wiley, 1966.

Bulfinch, T. *Bulfinch's mythology; the age of fable; the age of chivalry; legends of Charlemagne*. New York: The Modern Library, 1934.

Burkhart, R. C., & Berheim, G. *Object questions manual*. University Park, Pennsylvania: Pennsylvania State University, 1963.

Burkhart, R. C., & Neil, H. M. *Identity and teacher learning*. Scranton, Pennsylvania: International Textbook Company, 1968.

Buros, O. K. (Ed.), *The fifth mental measurements yearbook*. Highland Park, New Jersey: The Gryphon Press, 1959.

Buros, O. K. (Ed.), *The seventh mental measurements yearbook.* Highland Park, New Jersey: The Gryphon Press, 1972.

Campbell, D. T., & Stanley, J. C. *Experimental and quasi-experimental designs for research.* Chicago: Rand McNally, 1963.

Carner, R. L. Levels of questioning. *Education,* 1963, 83, 546-550.

Clark, H. H. Linguistic processes in deductive reasoning. *Psychological review,* 1969, 76, 387-404.

Courtney, R. Drama and pedagogy. *Stage-Canada,* 1971, 6, 56-67.

Cronbach, L. J. The logic of experiments on discovery. In L. S. Shulman & E. R. Keislar (Eds.), *Learning by discovery: A critical appraisal.* Chicago: Rand McNally, 1966.

Cross, W. K. Handbook: A minicourse in inquiry. A minicourse for teacher education developed at Washington State University for experimental use only. Unpublished mimeographed material, 1970.

Day, H. I. The measurement of specific curiosity. In H. I. Day, D. E. Berlyne, & D. E. Hunt (Eds.), *Intrinsic motivation: A new direction in education.* Toronto: Holt, Rinehart & Winston, 1971.

De Cecco, J. P. *The psychology of learning and instruction: Educational psychology.* Englewood Cliffs, New Jersey: Prentice-Hall, 1968.

Doll, R. C. *Individualizing instruction.* Washington, D.C.: Association for Supervision and Curriculum Development, 1964.

Duker, S. Listening and reading. *Elementary school journal,* 1965, 65, 321-329.

Evanechko, P. O. Language arts. Unpublished mimeographed material, Faculty of Education, University of Victoria, 1972.

Evanechko, P. O. A taxonomy of literary skills and concepts. Unpublished mimeographed material, Faculty of Education, University of Victoria, 1973.

Ferguson, G. A. *Statistical analysis in psychology and education.* (3rd ed.), New York: McGraw-Hill, 1971.

Flanders, N. A. *Analyzing teaching behaviour.* Reading, Mass.: Addison-Wesley, 1970.

Frost, J. L. Language development in children. In Pose Lamb (Ed.), *Guiding children's language learning.* Dubuque, Iowa: Wm. C. Brown, 1967.

Gagné, R. M. Contributions of learning to human development. *Psychological review,* 1968, 75, 177-191.

Gagné, R. M., & Smith, E. C., Jr. A study of the effects of verbalization on problem solving. *Journal of experimental psychology,* 1962, 63, 12-18.

Gall, M. D. The use of questions in teaching. *Review of educational research,* 1970, 40, 707-721.

Galloway, C. G., & Mickelson, N. I. Improving the quality of teachers' questions. *The elementary school journal,* 1973, in press.

Garrett, H. E. *Elementary statistics.* (2nd ed.) New York: David McKay, 1962.

Glaser, R. Variables in discovery learning. In L. S. Shulman & E. R. Keisler (Eds.), *Learning by discovery: A critical appraisal.* Chicago: Rand-McNally, 1966.

Guilford, J. P. *The nature of human intelligence.* New York: McGraw-Hill, 1967.

Guilford, J. P., & Merrifield, P. R. *The structure of intellect model: Its uses and implications.* The University of Southern California: Reports from the Psychological Laboratory, 1960, #24.

Guszak, F. J. Teacher questioning and reading. *The reading teacher,* 1967, 21, 227-234.

Halliday, M. A. K. Relevant models of language. In A. M. Wilkinson (Ed.), *The state of language.* Birmingham, England: University of Birmingham, 1969.

Harvison, A. R. Critical reading for elementary pupils. *The reading teacher,* 1967, 21, 244-247.

Hess, R. D., & Shipman, V. C. Early experience and the socialization of cognitive modes in children. *Childhood development,* 1965, 36, 869-886.

Hunkins, F. P. *Questioning strategies and techniques.* Boston: Allyn and Bacon, 1972.

Josephson, I. Linguistics and discovery teaching. *College English,* 1969, 30, 376-380.

Lanier, R. J., & Davis, A. P. Developing comprehension through teacher-made questions. *The reading teacher,* 1972, 26, 153-157.

Larson, R. L. Discovery through questioning: A plan for teaching rhetorical invention. *College English,* 1968, 30, 126-134.

Loban, W. *Language ability: Grades ten, eleven, and twelve.* Berkeley: University of California, 1967.

Logan, L. M., & Logan, V. G. *A dynamic approach to language arts.* Toronto: McGraw-Hill, 1967.

Lundsteen, S. W. Critical listening: An experiment. *Elementary school journal,* 1966, 66, 311-315.

Lundsteen, S. W. Critical listening and thinking: A recommended goal for future research. *Journal of research and development in education,* 1969, 3, 119-133.

Mackworth, N. H. Originality. *American psychologist,* 1965, 20, 51-66.

Mangione, R. A. How to train students and teachers to ask questions. *English education,* 1972, 4, 48-52.

Maw, W. H. Differences in the personalities of children differing in curiosity. In H. I. Day, D. E. Berlyne, & D. E. Hunt (Eds.), *Intrinsic motivation: A new direction in education.* Toronto: Holt, Rinehart,and Winston, 1971.

Maw, W. H., & Maw, E. W. Children's curiosity as an aspect of reading comprehension. *The Reading Teacher,* 1962, 15, 236-240.

Morine, H., & Morine, G. *Discovery: A challenge to teachers.* Englewood Cliffs, New Jersey: Prentice-Hall, 1973.

Mosher, F. A., & Hornsby, J. R. On asking questions. In J. S. Bruner (Ed.), *Studies in cognitive growth.* New York: Wiley, 1966.

Parker, E. A. *Teaching the reading of fiction.* New York: Teachers College Press, 1969.

Peel, E. A. *The pupil's thinking.* (Rev. ed.), London: Oldbourne, 1967.

Peel, E. A. *The nature of adolescent judgment.* London: Staples, 1971.

Pei, M. *Glossary of linguistic terminology.* New York: Doubleday, 1966.

Postman, N., & Weingartner, C. *Linguistics: A revolution in teaching.* New York: Delacorte, 1966.

Pringle, M. L. K., & McKenzie, J. R. Teaching method and rigidity in problem solving. *British journal of educational psychology,* 1965, 35, 50-59.

Ruddell, R. B. Oral language and the development of other language skills. *Elementary English,* 1966, 43, 489-498.

Russell, D. H. The prerequisite: Knowing how to read critically. *Elementary English,* 1963, 40, 579-582.

Russell, D. H., & Russell, E. F. *Listening aids through the grades.* New York: Columbia University, 1959.

Sanders, N. *Classroom questions, what kinds?* New York: Harper & Row, 1966.

Sapir, E. Language. *Encyclopedia of the social sciences,* 1937, 9, 155-169.

Schwab, J. J. Inquiry and the reading process. *Journal of general education,* 1958, 11, 72-82.

Science Research Associates. *Reading laboratory, elementary edition.* (kit) Chicago: Author, 1958.

Sequential Tests of Educational Progress. *Listening.* Berkeley, California: Author, 1957.

Sequential Tests of Educational Progress. *Listening: Manual for interpreting scores.* Berkeley, California: Author, 1957.

Sequential Tests of Educational Progress. *Technical report.* Berkeley, California: Author, 1957.

Sequential Tests of Educational Progress. *Teacher's guide.* Berkeley, California: Author, 1959.

Shulman, L. S., & Keislar, E. R. (Eds.), *Learning by discovery: A critical appraisal.* Chicago: Rand McNally, 1966.

Smith, E. B., Goodman, K. S., & Meredith, R. *Language and thinking in the elementary school.* New York: Holt, Rinehart and Winston, 1970.

Smith, F. *Understanding reading.* New York: Holt, Rinehart & Winston, 1971.

Spache, G. D. *Toward better reading.* Champaign, Illinois: Garrard, 1963.

Spache, G. D., & Spache, E. B. *Reading in the elementary school.* Boston: Allyn and Bacon, 1969.

Stauffer, R. G. Children can read and think critically. *Education,* 1960, 80, 522-525.

Stauffer, R. G. Language and the habit of credulity. In R. G. Stauffer (Ed.), *Language and the higher thought processes.* Champaign, Illinois: National Council of Teachers of English, 1965.

Strasser, B. B. *Teaching toward inquiry.* Los Angeles: National Education Association Publications Center for the Study of Instruction, 1971.

Suchman, J. R. Inquiry training in the elementary school. *Science teacher,* 1960, 27, 42-47.

Suchman, J. R. The child and the inquiry process. A paper presented at the meeting of the Eighth ASCD Curriculum Research Institute, Western Section, Anaheim, California, December, 1962.

Suchman, J. R. Learning through inquiry. *National education association journal,* 1963, 52, 31-32.

Suchman, J. R. Motivation inherent in the pursuit of meaning: Or the desire to inquire. In H. I. Day, D. E. Berlyne, & D. E. Hunt (Eds.), *Intrinsic motivation: A new direction in education.* Toronto: Holt, Rinehart and Winston, 1971.

Taba, H. The teaching of thinking. *Elementary English,* 1965, 42, 534-542.

Taylor, S. E. *Listening: What research says to the teacher.* Washington: National Education Association, 1964.

Thorn, E. A. A case for listening instruction. Mimeographed material, Toronto: Gage, Education, 6:11, undated.

Vygotsky, L. S. Thought and speech. In S. Saporta (Ed.), *Psycholinguistics.* New York: Holt, Rinehart and Winston, 1961.

Wees, W. R. *Teaching language as thinking.* Mimeographed material, Toronto: Gage, Education, 6:8, undated.

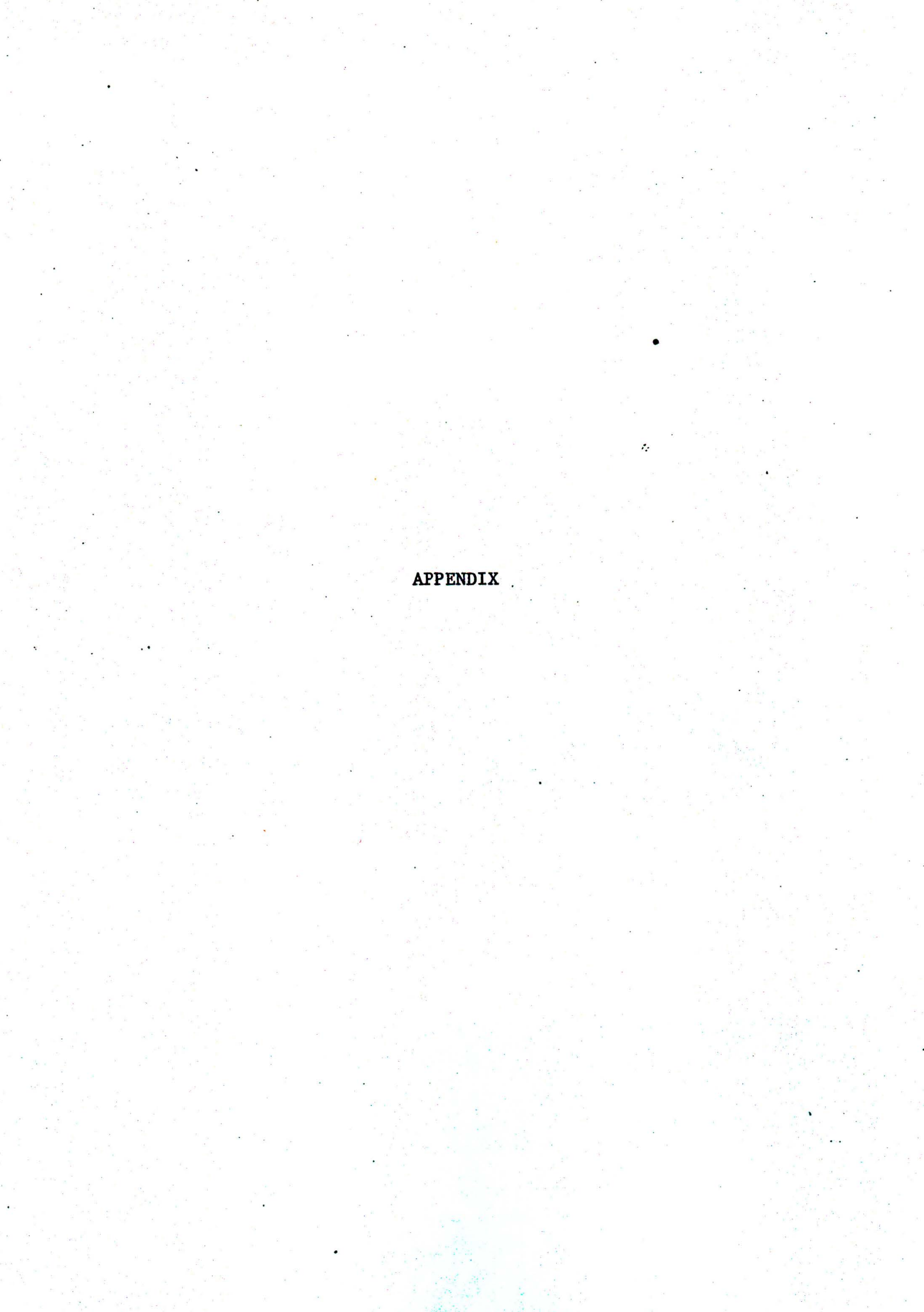
Wellington, S., & Wellington, B. What is a question? *The clearing house,* 1962, 36, 471-472.

Wheelwright, P. E. *The burning fountain; a study in the language of symbolism.* Bloomington, Indiana: University Press, 1954.

Whorf, B. L. Science and linguistics. In S. Saporta (Ed.), *Psycholinguistics.* New York: Holt, Rinehart and Winston, 1961.

Wittrock, M. C. The learning-by-discovery hypothesis. In L. S. Shulman & E. R. Keisler (Eds.), *Learning by discovery: A critical appraisal.* Chicago: Rand McNally, 1966.

Zahorik, J. A. Questioning in the classroom. *Education,* 1971, 91, 358-363.



APPENDIX

Table A

Summary Outline of Reading Skills

(Evanechko, 1971; Parker, 1969; Smith *et al.*, 1970)

1. Recoding
    a. relationships between aural and graphic perceptual input
    b. ability to select minimal cues
    c. ability to recode graphic language as aural language through intonation
    d. ability to recognize words and parts of words

2. Decoding
    a. ability to select and use available syntactic cues
    b. ability to select and use available semantic cues
    c. increased effectiveness in tentative decoding on the basis of minimal cues
    d. use of sequential constraints
    e. elimination of recoding and movement towards direct decoding

3. Acquisition of knowledge through reading
    a. reading of instructions, directions
        1) identify task
        2) grasp sequence
        3) identify additional information needed
    b. reading of signs, labels, street signs
    c. reading of questions and similar material needing responses
    d. reading of informational materials
        1) text
        2) other
    e. reading of essays, editorials
    f. reading of special materials, maps, charts
    g. reference skills
        1) use of index, table of contents
        2) use of dictionary, encyclopedia, other sources
        3) library use
        4) underlining, note taking

4. Critical reading
    a. ability and criteria for screening information
        1) plausibility
        2) evidence
        3) source
        4) values
    b. awareness of and ability to identify devices used to influence acceptance and belief
        1) advertising
        2) sales pitches
        3) political addresses
        4) propaganda
        5) personal relationships
    c. reading with an open but skeptical mind

Summary Outline of Reading Skills (continued)

5. Aesthetic and evaluative uses of reading (literature)
   a. stories, novels, poetry
      1) notes significant details
      2) comprehends implied meanings
      3) follows a sequence of events
      4) predicts outcomes
      5) forms and reacts to sensory images
      6) detects mood
      7) detects author's perspective
      8) appreciates humour, incongruity, exaggeration
      9) comprehends symbol
      10) comprehends extended metaphor
      11) recognizes various forms of prose and poetry
      12) recognizes figurative expressions
      13) recognizes theme
      14) recognizes plot contrivances
      15) recognizes conflict in plot structure
      16) recognizes author's style
      17) identifies effective words and phrases
      18) identifies effective sentence forms and patterns
      19) appreciates intonation patterns
      20) perceives the elements of story form
          - character
          - incident
          - tone
          - place
          - mood
          - archetype
   b. nonfiction
      1) biography and history
      2) travel and adventure
   c. drama

Table B

Summary Outline of Listening Skills

(Logan & Logan, 1967; Smith, et al., 1970)

1. Decoding
   a. increased perception
   b. increased concentration
   c. increased use of dialects and idiolects
   d. increased use of key elements and useful cues
   e. development of strategies for distilling main points
   f. can understand and follow directions or identify required information
   g. distill from questions the essential request for information being made
   h. increased sensitivity to paralinguistics

2. Aesthetic functions
   a. can listen effectively to stories read or told
      1) enjoys the wit, humour, style of the speaker
      2) appreciates the content, theme, and mood
      3) forms and reacts to sensory images
   b. listens effectively to poetry
      1) appreciates form
      2) recognizes metre
      3) is aware of poetic devices for communication of affective feelings and reactions
   c. listens effectively to drama: stage, radio, television, film, cartoon
      1) developing criteria of taste and preference
      2) developing sense of form and medium
      3) developing sense of dramatic device

3. Critical listening
   a. ability and criteria for screening information
      1) plausibility
      2) evidence
      3) source
      4) values
   b. awareness of and ability to identify devices used to influence acceptance and belief
      1) advertising
      2) sales pitches
      3) political addresses
      4) propaganda
      5) personal relationships
   c. developing strategies of listening with an open but skeptical mind

Summary Outline of Listening Skills (Continued)

4. Retention of knowledge
    a. note taking
    b. summarizing
    c. distilling and assimilating knowledge while listening

5. Listening to oneself
    a. self-evaluation of effectiveness
    b. specific diagnosis for improvement

Table C

One-Way Analyses of Variance of the BBH Reading Test and the STEP Listening Test: Treatment (N=69) and Control (N=66) Groups: Pretests (df= $\frac{1}{133}$)

Reading	Means		F	p
	Treatment	Control		
1. Vocabulary	30.91	26.45	6.23	.01**
2. Information	11.72	11.42	.08	.77
3. Relationships	11.57	9.88	4.23	.04*
4. Interpretation	10.29	8.65	3.05	.08
5. Appreciation	12.59	9.94	5.95	.02*
6. Literal Comprehension	23.29	21.30	1.47	.23
7. Creative Reasoning	22.88	18.59	5.56	.02*
8. General Comprehension	46.17	39.89	3.98	.05*
Listening				
9. Literal Comprehension	25.51	25.05	.69	.41
10. Interpretation	22.22	20.29	7.37	.01**
11. Evaluation and Application	12.83	11.98	2.58	.11
12. General Comprehension	60.58	57.35	4.25	.04*

*p ≤ .05

**p ≤ .01

Table D

Correlations Between the BBH Reading Test and the STEP Listening Test: Treatment Group: Pretests (N = 69; df = 67)

Reading	1	2	3	4	5	6	7	8	9	10	11	12
1. Vocabulary	1.000											
2. Information	.550	1.000										
3. Relationships	.724	.515	1.000									
4. Interpretation	.662	.413	.539	1.000								
5. Appreciation	.707	.533	.656	.667	1.000							
6. Literal Comprehension	.717	.904	.833	.536	.672	1.000						
7. Creative Reasoning	.751	.522	.658	.902	.924	.666	1.000					
8. General Comprehension	.805	.766	.810	.801	.883	.900	.925	1.000				
Listening												
9. Literal Comprehension	.546	.259	.467	.418	.487	.401	.498	.496	1.000			
10. Interpretation	.654	.366	.535	.414	.449	.504	.474	.534	.736	1.000		
11. Evaluation and Application	.556	.434	.498	.461	.537	.529	.549	.591	.605	.631	1.000	
12. General Comprehension	.676	.399	.572	.485	.556	.544	.572	.612	.869	.925	.824	1.000

α .05 (r = .238)   α .01 (r = .307)

Table E

Correlations Between the BBH Reading Test and the STEP Listening Test: Treatment Group: Posttests (N = 69; df = 67)

Reading	1	2	3	4	5	6	7	8	9	10	11	12
1. Vocabulary	1.000											
2. Information	.677	1.000										
3. Relationships	.657	.508	1.000									
4. Interpretation	.422	.395	.350	1.000								
5. Appreciation	.561	.508	.613	.550	1.000							
6. Literal Comprehension	.768	.884	.851	.430	.642	1.000						
7. Creative Reasoning	.567	.520	.565	.844	.912	.623	1.000					
8. General Comprehension	.742	.782	.788	.705	.861	.903	.899	1.000				
Listening												
9. Literal Comprehension	.506	.423	.516	.366	.480	.538	.488	.570	1.000			
10. Interpretation	.523	.423	.395	.352	.546	.472	.524	.552	.774	1.000		
11. Evaluation and Application	.515	.502	.486	.386	.471	.569	.492	.589	.740	.786	1.000	
12. General Comprehension	.586	.485	.523	.418	.563	.579	.567	.636	.915	.934	.878	1.000

α .05 (r = .238) α .01 (r = .307)

Table F

Correlations Between the BBH Reading Test and the STEP Listening Test:
Treatment Group: Retention Tests (N = 69; df = 67)

Reading	1	2	3	4	5	6	7	8	9	10	11	12
1. Vocabulary	1.000											
2. Information	.702	1.000										
3. Relationships	.726	.678	1.000									
4. Interpretation	.590	.692	.603	1.000								
5. Appreciation	.651	.732	.707	.573	1.000							
6. Literal Comprehension	.776	.918	.904	.703	.791	1.000						
7. Creative Reasoning	.701	.789	.739	.851	.903	.836	1.000					
8. General Comprehension	.770	.890	.856	.813	.885	.957	.960	1.000				
Listening												
9. Literal Comprehension	.548	.530	.509	.486	.567	.583	.605	.620	1.000			
10. Interpretation	.623	.552	.527	.516	.554	.592	.608	.627	.762	1.000		
11. Evaluation and Application	.485	.530	.453	.363	.470	.558	.487	.544	.712	.730	1.000	
12. General Comprehension	.611	.592	.551	.507	.587	.638	.629	.661	.918	.922	.878	1.000

α .05 (r = .238)   α .01 (r = .307)

Table G

Correlations Between the BBH Reading Test and the STEP Listening Test: Control Group: Pretests (N = 66; df = 64)

Reading	1	2	3	4	5	6	7	8	9	10	11	12
1. Vocabulary	1.000											
2. Information	.501	1.000										
3. Relationships	.508	.562	1.000									
4. Interpretation	.597	.533	.631	1.000								
5. Appreciation	.473	.411	.468	.529	1.000							
6. Literal Comprehension	.569	.910	.855	.651	.493	1.000						
7. Creative Reasoning	.605	.532	.619	.847	.899	.645	1.000					
8. General Comprehension	.648	.789	.809	.829	.774	.901	.912	1.000				
Listening												
9. Literal Comprehension	.523	.379	.439	.495	.433	.458	.526	.544	1.000			
10. Interpretation	.579	.322	.402	.520	.416	.404	.529	.516	.710	1.000		
11. Evaluation	.452	.365	.449	.558	.344	.454	.504	.529	.544	.542	1.000	
12. General Comprehension	.603	.411	.507	.616	.465	.513	.609	.620	.867	.897	.796	1.000

α .05 (r = .243) α .01 (r = .315)

Table H

Correlations Between the BBH Reading Test and the STEP Listening Test: Control Group: Posttests (N = 66; df = 64)

Reading	1	2	3	4	5	6	7	8	9	10	11	12
1. Vocabulary	1.000											
2. Information	.665	1.000										
3. Relationships	.525	.546	1.000									
4. Interpretation	.536	.410	.374	1.000								
5. Appreciation	.687	.568	.394	.480	1.000							
6. Literal Comprehension	.679	.887	.870	.446	.551	1.000						
7. Creative Reasoning	.718	.576	.447	.831	.887	.584	1.000					
8. General Comprehension	.785	.820	.738	.720	.809	.888	.892	1.000				
Listening												
9. Literal Comprehension	.539	.457	.340	.503	.620	.456	.659	.627	1.000			
10. Interpretation	.591	.504	.493	.526	.622	.567	.671	.696	.630	1.000		
11. Evaluation and Application	.542	.386	.429	.435	.577	.463	.595	.595	.689	.742	1.000	
12. General Comprehension	.647	.526	.479	.573	.687	.573	.737	.737	.827	.929	.857	1.000

α .05 (r = .243)   α .01 (r = .315)

Table I

Correlations Between the BBH Reading Test and the STEP Listening Test: Control Group: Retention Tests (N = 66; df = 64)

Reading	1	2	3	4	5	6	7	8	9	10	11	12
1. Vocabulary	1.000											
2. Information	.460	1.000										
3. Relationships	.535	.426	1.000									
4. Interpretation	.580	.476	.655	1.000								
5. Appreciation	.577	.574	.568	.645	1.000							
6. Literal Comprehension	.584	.900	.773	.646	.670	1.000						
7. Creative Reasoning	.626	.596	.668	.887	.913	.734	1.000					
8. General Comprehension	.651	.795	.771	.830	.857	.924	.938	1.000				
Listening												
9. Literal Comprehension	.525	.330	.415	.689	.514	.437	.650	.589	1.000			
10. Interpretation	.517	.454	.406	.588	.511	.516	.590	.595	.735	1.000		
11. Evaluation and Application	.570	.426	.471	.678	.575	.528	.671	.648	.703	.716	1.000	
12. General Comprehension	.592	.448	.473	.717	.587	.546	.701	.673	.903	.922	.876	1.000

α .05 (r = .243) α .01 (r = .315)

Table J

Correlations Across Testing Periods Between the BBH Reading Test and the STEP Listening Test: Treatment Group (N = 69; df = 67)

Reading	Listening											
	Pretest				Posttest				Retention Test			
Pretest	LC*	I*	EA*	GC*	LC*	I*	EA*	GC*	LC*	I*	EA*	GC*
Vocabulary	.546	.654	.556	.676	.603	.607	.643	.695	.580	.620	.501	.629
Information	.259	.366	.434	.399	.495	.444	.463	.523	.342	.455	.478	.463
Relationships	.467	.535	.498	.572	.510	.506	.576	.603	.473	.504	.419	.517
Interpretation	.418	.414	.461	.485	.521	.486	.476	.550	.552	.522	.457	.564
Appreciation	.487	.449	.537	.556	.512	.607	.603	.621	.526	.584	.436	.573
Literal Comprehension	.401	.504	.529	.544	.575	.540	.587	.640	.457	.546	.518	.557
Creative Reasoning	.498	.474	.549	.572	.565	.602	.595	.643	.589	.607	.488	.623
General Comprehension	.496	.534	.591	.612	.624	.628	.647	.703	.578	.634	.550	.649
Posttest												
Vocabulary	.544	.571	.442	.597	.506	.523	.515	.586	.590	.576	.451	.599
Information	.366	.427	.379	.435	.423	.423	.502	.485	.475	.494	.481	.529
Relationships	.431	.394	.383	.455	.516	.395	.486	.523	.502	.496	.416	.525
Interpretation	.249	.314	.242	.307	.366	.352	.386	.418	.211	.318	.221	.274
Appreciation	.478	.379	.370	.446	.480	.546	.471	.563	.487	.495	.373	.503
Literal Comp.	.457	.473	.438	.514	.538	.472	.569	.579	.561	.570	.518	.607
Creative Reasoning	.429	.398	.356	.437	.488	.524	.492	.567	.416	.474	.348	.458
General Comp.	.492	.484	.442	.528	.570	.552	.589	.636	.543	.580	.482	.591
Retention Test												
Vocabulary	.547	.596	.468	.619	.587	.583	.598	.655	.548	.623	.485	.611
Information	.507	.424	.557	.552	.593	.509	.539	.611	.530	.552	.530	.592
Relationships	.500	.431	.435	.505	.596	.535	.521	.610	.509	.527	.453	.551
Interpretation	.437	.460	.383	.491	.461	.443	.394	.503	.486	.516	.363	.507
Appreciation	.461	.441	.553	.547	.647	.613	.579	.666	.567	.554	.470	.587
Literal Comp.	.552	.477	.557	.588	.648	.565	.583	.667	.583	.592	.558	.638
Creative Reasoning	.510	.512	.514	.584	.627	.598	.560	.659	.605	.608	.487	.629
General Comp.	.554	.517	.558	.611	.665	.607	.597	.692	.620	.627	.544	.661

α.05 (r=.238) α.01 (r=.307) *LC Literal Comprehension, I Interpretation, EA Evaluation and Application, GC General Comprehension.

TABLE K

Correlations Across Testing Periods Between the BBH Reading Test and the STEP Listening Test: Control Group (N = 66; df = 64)

Reading	Listening											
	Pretest				Posttest				Retention Test			
Pretest	LC*	I*	EA*	GC*	LC*	I*	EA*	GC*	LC*	I*	EA*	GC*
Vocabulary	.523	.579	.452	.603	.533	.630	.505	.649	.520	.535	.606	.609
Information	.379	.322	.365	.411	.344	.427	.343	.435	.336	.450	.423	.447
Relationships	.439	.402	.449	.507	.447	.482	.458	.561	.417	.467	.483	.504
Interpretation	.495	.520	.558	.616	.561	.598	.567	.653	.509	.579	.634	.632
Appreciation	.433	.416	.344	.465	.420	.585	.520	.565	.355	.404	.442	.441
Literal Comprehension	.458	.404	.454	.513	.440	.510	.445	.555	.420	.517	.508	.534
Creative Reasoning	.526	.529	.504	.609	.553	.675	.618	.691	.485	.552	.604	.602
General Comprehension	.544	.516	.529	.620	.549	.656	.589	.689	.500	.590	.615	.627
Posttest												
Vocabulary	.534	.561	.552	.639	.539	.591	.542	.647	.516	.563	.581	.612
Information	.387	.378	.418	.461	.457	.504	.386	.526	.435	.494	.528	.536
Relationships	.387	.378	.388	.441	.340	.493	.429	.479	.471	.475	.581	.557
Interpretation	.466	.507	.503	.570	.503	.526	.435	.573	.466	.396	.476	.489
Appreciation	.523	.522	.478	.591	.620	.622	.577	.687	.390	.464	.506	.499
Literal Comp.	.440	.430	.459	.513	.456	.567	.463	.573	.514	.552	.630	.621
Creative Reasoning	.577	.598	.568	.674	.659	.671	.595	.737	.492	.503	.572	.574
General Comp.	.572	.578	.577	.668	.627	.696	.595	.737	.565	.592	.675	.671
Retention												
Vocabulary	.441	.505	.456	.541	.476	.582	.494	.599	.525	.517	.570	.592
Information	.272	.243	.278	.312	.387	.370	.377	.408	.330	.454	.426	.448
Relationships	.422	.451	.407	.494	.385	.491	.409	.520	.415	.406	.471	.473
Interpretation	.531	.574	.468	.627	.570	.641	.625	.680	.689	.588	.678	.717
Appreciation	.364	.416	.495	.506	.526	.589	.599	.634	.514	.511	.575	.587
Literal Comp.	.395	.384	.394	.456	.458	.498	.458	.539	.437	.516	.528	.546
Creative Reasoning	.475	.526	.521	.606	.579	.678	.671	.714	.650	.590	.671	.701
General Comp.	.469	.492	.495	.574	.560	.636	.612	.677	.589	.595	.648	.673

α.05 (r=.243) α.01 (r = .315) *LC Literal Comprehension, I Interpretation
EA Evaluation and Application, GC General Comprehension

VITA

Surname: BRIGGS   Given Names: DOROTHY CHARMIAN ANNE

Place of Birth: GRAHAMDALE, MAN.   Date of Birth: AUGUST 31, 1936

Educational Institutions Attended, with Dates of Entering and Leaving:

Institution	Dates
UNIVERSITY OF BRITISH COLUMBIA	1954 to 1955
PROVINCIAL NORMAL SCHOOL	1955 to 1956
UNIVERSITY OF BRITISH COLUMBIA (part time)	1957 to 1966
UNIVERSITY OF BRITISH COLUMBIA	1968 to 1969

Degrees, Diplomas, Etc., Awarded, with Dates and Names of Institutions:

Degree	Date	Institution
B.Ed. (Elem.)	1966	University of British Columbia

Honors and Awards:

P.E.O. Scholarship, 1954/55

British Columbia Government Scholarship, 1954/55

Publications:

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RELATIONSHIPS BETWEEN INQUIRY BEHAVIOUR AND INTERMEDIATE CHILDREN'S READING AND LISTENING SKILLS

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DOROTHY CHARMIAN ANNE BRIGGS
Name

August 17, 1973
Date