CALIFORNIA STATE UNIVERSITY, NORTHRIDGE

EFFECTS OF TEACHER QUESTIONING
ON CRITICAL THINKING

A thesis submitted in partial satisfaction of the requirements for the degree of Master of Arts in

Education, Elementary Reading Improvement

by

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ABSTRACT

EFFECTS OF TEACHER QUESTIONING
ON CRITICAL THINKING

by

Judith Evelyn Munk

Master of Arts in Elementary Education:
Reading Improvement

The purpose of this study was to ascertain the effects of questions representative of different cognitive levels on the critical thinking of third-graders.

The sixty subjects, participating in the eight week study, were divided into an experimental and a control group. A Pretest-Posttest Control Group design was employed. The subtests for Interpretative and Critical Comprehension of the McGraw Hill Prescriptive Reading Inventory, Level A, were used as the research instrument.

Both the experimental and the control group read silently the same five stories in the Houghton Mifflin preprimer Dinosaurs (1971). Following the silent reading of each story, the control group was asked oral questions calling for literal comprehension, interpretative thinking, and evaluative and creative thinking that appeared in
the teacher's guide of Dinosaurs. After the silent reading of each story, the experimental group was asked oral teacher-made questions based on Bloom's cognitive levels of comprehension, application, analysis, synthesis, and evaluation.

The $t$ test for correlated data was applied to test the three hypotheses. The level of significance necessary to reject the null hypotheses was set at the .01 level of confidence.

The results of the present study indicate that there was a significant difference between the pretest and posttest mean scores on the subtests of Interpretative and Critical Comprehension of the McGraw Hill Prescriptive Reading Inventory, Level A, for the experimental group. A significant $t$ ratio was attained on the difference between the pretest and posttest mean scores on the subtests of critical thinking of the McGraw Hill Prescriptive Reading Inventory, Level A, for the control group.

No significant difference was found on the comparison of posttest mean scores between the experimental group and the control group on the subtests of critical thinking of the McGraw Hill Prescriptive Reading Inventory, Level A.

The results do indicate, however, that critical thinking skills can be improved through a teacher's guided instruction.
CHAPTER I

THE PROBLEM

Introduction

Questioning is a major technique used in teaching. Asking questions is one of the basic ways that the teacher stimulates student learning and thinking. The teacher's role in developing the thinking skills of students cannot be underestimated. Unfortunately, many teachers emphasize questions that require rote memorization as opposed to questions that require reflection and judgment. Gall (1970) found that about sixty percent of teachers' questions require students to recall facts. Too often, the development of critical thinking, which involves higher levels of understanding, is overlooked (Carner, 1963). Carin (1971) suggests that "the questions a teacher asks can make the difference between an antiquated educational wasteland and an exciting learning environment (p.2)".

Teachers' apparent emphasis upon questions asking for direct recall seems to neglect the need to use thinking skills that go beyond literal meaning. People in our society must read critically
and make value judgments all the time. Today's society is constantly bombarded with propaganda and advertising techniques from radio, television, and the newspaper. The ability to see through propaganda, to choose between two opinions, and to change a way of thinking when new evidence proves an old idea wrong or outdated, all involve critical thinking.

Since deeper levels of thinking seem to be necessary, appropriate questioning techniques could lead to the development of critical thinking. Researchers have developed categories which serve to classify teachers' questions. One of the classification systems that has been devised is Bloom's hierarchy of cognitive levels. A questioning method based on Bloom's Taxonomy (1956) can be used to ask questions that go beyond recall. The incorporation of questions at many levels in Bloom's hierarchy may be used as a teaching technique in providing stimulation and practice in answering higher level questions. Such a teaching technique may enhance student achievement in critical thinking skills.

Statement of the Problem

The classroom provides the environment where questioning techniques can be used. Studies have described the kind and frequency of questions that teachers ask. Research done by Guszak (1967) and
Derhammer and Gormier (1972) concluded that the dominant mode of thinking stimulated by teacher questions is at the level of direct recall. Teachers appear to equate thinking skills with literal meaning.

Although the development of thinking abilities appears to be an accepted goal of education, it seems that questions requiring higher level thinking are often overlooked and replaced by items asking for direct recall (Mueller, 1972). There has been some research on critical thinking in the classroom. Research is limited, however, on the types of classroom methods that help to develop students' critical thinking. As a basic teaching strategy, it appears that teachers' questions can be used to guide students toward deeper levels of understanding. The purpose of this study is to ascertain the effects of questions representative of different cognitive levels on the critical thinking skills of third graders.

Limitation of the Problem

The study was limited to sixty third-grade students of a lower socioeconomic level from an inner city area of Los Angeles. Generalizations that are stated in this study may not apply to middle and upper middle class children or to children in other geographic areas. The findings of this study may only be relevant to the subjects used in this investigation.
Hypotheses

Hypotheses drawn for this study were:

Ho₁ There will be no significant differences between pretest and posttest mean scores for the experimental group on the McGraw Hill Prescriptive Reading Inventory, Level A, subtests for critical thinking.

Ho₂ There will be no significant differences between pretest and posttest mean scores for the control group on the McGraw Hill Prescriptive Reading Inventory, Level A, subtests for critical thinking.

Ho₃ There will be no significant differences between posttest mean scores for the experimental and the control groups on the McGraw Hill Prescriptive Reading Inventory, Level A, subtests for critical thinking.
Rationale of the Problem

Comprehension is generally considered to be a major problem in the schools. Focus should be placed upon understanding rather than on decoding and other word attack skills (Goodman, 1971). Several studies have shown that critical thinking and problem solving skills beyond recall do exist and can be measured in the primary grades (Frazier and Caldwell, 1977) (Smith, 1975).

Teachers may limit comprehension by primarily asking recall questions. Often students are accustomed to being tested only at the knowledge level. Teachers can do much to stimulate the development of higher levels of comprehension by asking questions that go beyond rote knowledge (Hansen and Lovitt, 1976). The kinds of questions that teachers ask can influence the depth of student thinking. It would appear that student training in thinking, especially through the type of teacher questioning employed, may accelerate the pace of thought development at higher cognitive levels (Wolf, King, and Huck, 1968).

Definition of Terms

The following definitions were selected for this study:
Cognitive Levels: The categories of Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation that Benjamin Bloom devised in his hierarchy of comprehension skills (Bloom, 1956).

Critical Thinking: The ability to identify relevant information, make predictions, draw inferences, and solve problems by using higher levels of thinking than knowledge (Sullivan, 1974).

Bloom's Taxonomy (1956) of the cognitive domain includes:

Knowledge Level of Comprehension: The ability to recall information which is directly stated in the story or passage.

Comprehension Level of Comprehension: This level of comprehension deals with the identification, understanding, and relationship between the major ideas in a particular story or passage.

Application Level of Comprehension: The ability to use previous knowledge in new situations.

Analysis Level of Comprehension: This level of comprehension deals with the separation of information into component parts.

Synthesis Level of Comprehension: The ability to solve a problem by putting information together through original, creative thinking.
Evaluation Level of Comprehension: The ability to make judgments that are based on clearly defined standards.

Summary

In Chapter I, the problem was defined, the limitation of the problem was established, the hypotheses were drawn, the rationale of the problem was stated, and the terms were defined. Chapter II presents a review of the related literature.
CHAPTER II

REVIEW OF LITERATURE

Introduction

Chapter one presented the problem of the study. Chapter two presents a review of the related literature under the following subheadings: Critical Thinking, Cognitive Levels and Questioning, and Effect of Teacher Questioning on Student Achievement.

Critical Thinking

The questioning techniques of teachers is one of the basic ways of stimulating and developing pupils' thinking (Carner, 1963). Many teachers tend to equate rote memory with the development of critical thinking. Simply asking children to recall what they have read is not adequate in developing critical reading and thinking skills. Instead of relying upon the memorization of facts, critical thinking "produces ideas, proposes solutions to problems, invents ways of doing things (Aschner, 1961, p. 46)."
According to educators, a major objective of the schools is to teach students to think. In spite of this belief, reading comprehension has been traditionally regarded as a person's understanding of what he has read through the retention of facts (Taba, 1965). This kind of understanding merely involves memory and literal recall. Education must be more than the memorization of information (Galloway and Mickelson, 1973). Too frequently, teachers stress the mechanics of reading and neglect the thinking aspect (Wolf, King, and Huck, 1968). Cramer (1970) says that reading and thinking are not the same. Teachers tend to regard comprehension as the memorization of facts. With such a point of view, teachers appear to overlook thought development that involves critical thinking (Galloway and Mickelson, 1973).

The emphasis on word recognition skills and literal comprehension may encourage naive acceptance of anything that appears in print (Wolf, King, and Huck, 1968). Often, through force of habit, children assume the inherent rightness of the printed page and develop a non-questioning attitude toward what they read.

Flanders (Amidon and Flanders, 1967) stresses the importance of the teacher in establishing the learning situation in the classroom. It is as important for the teacher to initiate critical thinking at the primary level as well as at the middle and upper
grade levels. Primary grade children can make comparisons, predictions, and judgments with information they see and hear (Sullivan, 1974), (Aschner, 1961). Research in child development indicates that young children are capable of critical reasoning (Wolf, King, and Huck, 1968). Reading instruction can provide numerous opportunities for students to expand and develop their abilities to think at these higher levels.

Jean Piaget summarized the purposes of education by stating:

The principal goal of education is to create men who are capable of doing new things, not simply of repeating what other generations have done—men who are creative, inventive, and discoverers. The second goal of education is to form minds which can be critical, can verify, and not accept everything they are offered. We need pupils who are active, who learn early to find out by themselves, partly by their own spontaneous activity and partly through materials we set up for them (Ripple and Rockcastle, 1964, p.5).

Cognitive Levels and Questioning

Bloom’s Taxonomy of Educational Objectives: Handbook I, Cognitive Domain, divides comprehension into six levels, knowledge, comprehension, application, analysis, synthesis, and evaluation. These six cognitive levels make up a classification system based on the type of learning process required to answer questions. This Taxonomy of learning skills is constructed as a hierarchy. Each division builds upon the preceding level. At the lowest cognitive
category, knowledge, the student is expected to recall facts that have been given to him (Wilson, 1969). With the higher levels of thinking, however, the student must sort out and use his existing knowledge to provide appropriate responses. These answers involve higher types of comprehension and can be referred to as critical thinking (Caskey, 1972).

Too often the development of comprehension skills in reading is limited to the recall of information (Stauffer, 1967). Students need to "go beyond literal comprehension and discover the implications of what is read (Dale, 1976, p. 30)". Practice is needed in identifying the major ideas and the relationships between them (comprehension level), using previous knowledge to solve new problems (application level), making guesses at what might happen (analysis level), thinking of new ways to do things (synthesis level), and offering opinions (evaluation level) (Ryan, 1971). These kinds of understanding involve critical thinking. More teachers need to stimulate such higher level understanding in the classroom (Carner, 1963).

Questions are important for guiding a student's progress from one cognitive level to another. A questioning scheme patterned after Bloom's Taxonomy can be used in reading instruction (Gall, 1970). By posing higher kinds of comprehension questions, the
teacher is seeking "relationships, conclusions, and judgments from the students (Ryan, 1971, p. 143)".

The teacher establishes the learning environment in the classroom. The teacher's questions decide the topic to be discussed and set up the cognitive tasks to be performed (Taba, 1965). Unfortunately, much classroom instruction is largely made up of the 'what', 'where', and 'when' questions. These types of questions usually require students to recall factual material. In contrast to this, open-ended questions are useful in encouraging the student to think beyond the facts that are directly stated (Cramer, 1970). Questions such as 'What would happen if ...?' or 'What did the author mean by ...?' are most likely to evoke imagination and thoughtful responses than questions designed merely to recall facts. In addition to obtaining information, questions may clarify an idea and may even test a hypothesis. Questions may also serve as rhetorical stimulation for further inquiry (Covington, 1967).

When posing questions involving higher levels of comprehension, there is the possibility that the student will evaluate facts inaccurately and thus produce wrong conclusions and invalid hypotheses. The major objective is not whether a student is right or wrong. Of prime significance is that students be given opportunities to make judgments, predict outcomes, and make comparisons that call for the
active engagement of higher cognitive levels (Cramer, 1970).

Effect of Teacher Questioning on Student Achievement

Questions, which play an important role in teaching, often serve as the medium through which teacher/student learning interaction takes place (Aschner, 1961). Flanders identified oral questioning as one of the ten major dimensions for studying teachers' behavior in his System for Interaction Analysis. According to Flanders, Interaction Analysis "is concerned with verbal behavior only, primarily because it can be observed with higher reliability than can nonverbal behavior. The assumption is made that the verbal behavior of an individual is an adequate sample of his total behavior (Amidon, 1967, p. 5)."

As a result of their research in children's thinking, Taba, Levine, and Elzey (1964) determined that teachers' questions are a very important aspect of the classroom environment. Studies have shown that the ability to analyze and evaluate ideas does not develop naturally as a result of chronological age. Instead, critical thinking is learned (Wolf, King, and Huck, 1968). The teacher's question asking techniques are an important determiner of what pupils learn, both in content and in the use of cognitive processes.
The pupil's role is one of responding to the teacher and with guided teacher instruction, the student's thinking process may be accelerated (Wolf, King, and Huck, 1968; Taba, 1965).

Teachers' questions are of little value unless they have an impact on student behavior. Studies have attempted to determine the relationship between teachers' questions and student achievement. Using Bloom's Taxonomy, Hunkins (1968) and Ryan (1973) concluded that students whose social studies instruction were guided by higher level questions scored significantly higher on a posttest of achievement than students who answered questions that stressed recall-type answers for the same material. Similar results were found in Smith's study (1975) involving taxonomic questioning during reading instruction. Analysis of covariance for achievement scores revealed significant differences (.01) in favor of the experimental group that had received higher cognitive levels of comprehension questions. The results of one investigation, however, indicated that higher level questions based on Bloom's Taxonomy did not outperform the subjects in the control group who were asked lower level questions that were also based on Bloom's Taxonomy.

The results of research suggest a relationship between the asking of higher level questions and the development of critical thinking. Frazier and Caldwell (1977) found that primary aged
children who were exposed to questions of higher cognitive levels increased in the ability to use critical thinking on a reading test of comprehension. Wolf, King, and Huck's (1968) study, involving twenty-four classes in grades one through six with two control and experimental groups at each grade level, found that the experimental groups, which received instruction in critical thinking, scored significantly higher total critical reading scores at all grade levels than did the control groups who were instructed in literature. The data showed that interpretative, analysis, and evaluative questions produced more critical responses from the students than other types of teachers' questions. This study's findings indicated that critical thinking skills can be improved through direct instruction.

Taba, Levine, and Elzey (1964) focused their research on the specific skills of interpreting, inferring, and generalizing. The data in their study implied that children can learn to make inferences, to generalize, and to make logical conclusions at an early age if they receive systematic instruction in thinking skills. Through the skillful guidance of teachers, especially through the questions they pose, critical thinking skills can be developed.

The results of these studies suggest that high level questions can be effective in moving students toward higher level understanding
(Ryan, 1973) (Turner, 1977). With such results, it would appear that teachers should use higher level questioning strategies more than they presently do.

The value of focusing on teachers' questions is that they are the basic unit underlying most methods of classroom teaching. "Teachers' questions, however, should not be viewed as an end in themselves. They are a means to an end--producing desired changes in student achievement (Gall, 1970, p. 718)." Their impact upon the thinking and learning of students cannot be overlooked. Too often, "teachers fall into the trap of expecting children to become parrots, repeating only what they found out that someone else wrote. Questions must encourage thought, not memory (Veatch, 1966, p. 131)."

**Summary**

Research shows that children are capable of critical thinking. Authorities cite the tendency of many educators to overemphasize the use of recall questions which require students to answer with facts or information that has been directly stated. Studies, yielding positive results, suggest the importance of oral questioning involving higher cognitive levels for the development of critical thinking.
From the related literature, one can conclude that reading instruction is an effective mode for stimulating higher levels of understanding. There is a need for further research in the development of effective pre-service and in-service programs to improve teachers' questioning strategies in the classroom. Additional investigation could also provide curriculum developers with suggestions for the implementation of higher level questioning when planning their instructional programs.
CHAPTER III

RESEARCH DESIGN

Introduction

In chapter three, the research design is discussed with reference to research typology, procedures, and testing instruments, time schedule, and sample selection.

Research Typology

A Pretest-Posttest Control Group design was used in this study. There was one experimental group and one control group.

Procedures and Testing Instruments

Using the subtests for Interpretative and Critical Comprehension of the McGraw Hill Prescriptive Reading Inventory, Level A, all the subjects were pretested for higher level thinking skills. Using matched pairs, students were then placed in either the experimental or control group. Reading achievement scores were used in an
analysis of covariance to test the hypotheses. Intelligence and sex were not controlled. The study was intended to measure the critical thinking post mean scores of third grade children who were orally asked comprehension questions appearing in the basal text with those third grade children who were orally asked teacher-made questions including comprehension, application, analysis, synthesis, and evaluation level questions.

Both the experimental and the control groups read the same five stories in Dinosaurs, the third preprimer level basal reader of the Houghton Mifflin reading series. The children were unfamiliar with this reading series since it is not the one the school uses in its preferred reading program.

Each session began with a short introduction by the teacher. This was to serve as motivation for the story to be read. Then the children read the story silently. If the students were unfamiliar with a word while reading silently, they were allowed to ask a child sitting near them. After everyone had finished reading the story, the children closed their books. Based on the story just read, the control group were asked literal comprehension, interpretative thinking, and evaluative and creative thinking questions appearing in the teacher's guide of Dinosaurs. The students were to answer these questions orally.
In their learning sessions, the experimental group read the same stories. After the silent reading of each story, the teacher asked them teacher-made comprehension, application, analysis, synthesis, and evaluation level comprehension questions.

At the end of the study, the students were posttested for critical thinking skills on the subtests of Interpretative and Critical Comprehension of the McGraw Hill Prescriptive Reading Inventory, Level A. Findings were subsequently analyzed for the difference in pretest and posttest mean scores of the experimental group, the difference in pretest and posttest mean scores of the control group, and for a comparison of posttest mean scores between the experimental and control group. The pretests and posttests were administered during the regular school day. All the instruction for the sessions as well as all the tests were scored, analyzed, and interpreted by the investigator.

The McGraw Hill Prescriptive Reading Inventory, Level A, was selected as the testing instrument because of: (1) excellent directions for administration of the test, (2) appropriate subtests, and (3) availability.

**Time Schedule**

Each group met once a week for thirty minutes a session. The duration of the entire study was eight weeks.
Sample Selection

The control group consisted of thirty third-graders whose reading levels ranged from preprimer level as determined by the placement tests of the Harper and Row reading program. The experimental group also consisted of thirty third-graders whose range of reading levels were the same as for the control group. The sixty subjects, selected from four different classrooms, were randomly selected by a matching process involving pretest scores. No attempt was made to control sex and I.Q. in the selection of the sample for the study. Subjects attended an inner city school in the Los Angeles area and were selected from a student population composed of sixty percent Black and forty percent Chicano.
CHAPTER IV

PRESENTATION AND ANALYSIS OF THE DATA

Chapter four explains the statistical procedure used, presents the data, and analyzes the results.

TREATMENT OF THE DATA

The t test for correlated data was applied to test hypotheses one through three. In each instance the level of significance necessary to reject the null hypothesis was set at the .01 level. Each hypothesis was treated independently. When the t ratio was not significant, the null hypothesis was not rejected. An abbreviated n.s. was used to indicate nonsignificance.

PRESENTATION OF THE DATA

Ho1. The null hypothesis stated that there would be no significant differences between pretest and posttest mean scores for the experimental group on the subtests for Interpretative and Critical Comprehension of the McGraw Hill Prescriptive Reading Inventory,
Level A. The data in Table I shows the results of the comparison.

**TABLE I**

**A COMPARISON OF THE PRETEST AND POSTTEST CRITICAL THINKING SUBTESTS MEAN SCORES FOR THE EXPERIMENTAL GROUP**

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Standard Error</th>
<th>df</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pretest</strong></td>
<td>30</td>
<td>31.76</td>
<td>13.14</td>
<td>2.39</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Posttest</strong></td>
<td>30</td>
<td>35.23</td>
<td>12.93</td>
<td>2.36</td>
<td>29</td>
<td>2.80*</td>
</tr>
</tbody>
</table>

* p < .01
There was a significant difference in the pretest and posttest mean scores for the experimental group. Therefore, the null hypothesis was rejected beyond the .01 level of significance. The experimental subjects who received oral teacher-made questions including the cognitive levels of comprehension, application, analysis, synthesis, and evaluation by the certificated teacher made significant gains on the Interpretative and Critical Thinking subtests of the McGraw Hill Prescriptive Reading Inventory, Level A.

H02 The null hypothesis stated that there would be no significant difference between the pretest and posttest mean scores for the control group on the McGraw Hill Prescriptive Reading Inventory, Level A, subtests for critical thinking. The statistical data in Table II presents a comparison of the pretest and posttest mean scores for the control group.

There was a significant difference in the pretest and posttest mean scores for the control group. Therefore, Hypothesis Number 2 was rejected at the .01 level of significance. The control subjects who received oral questions from the basal text calling for literal comprehension, interpretative thinking, and evaluative and creative thinking by the certificated teacher made significant gains on the critical thinking subtest of the McGraw Hill Prescriptive Reading Inventory, Level A.
<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Standard Error</th>
<th>df</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>30</td>
<td>31.53</td>
<td>12.75</td>
<td>2.32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Posttest</td>
<td>30</td>
<td>34.50</td>
<td>13.43</td>
<td>2.45</td>
<td>29</td>
<td>2.78*</td>
</tr>
</tbody>
</table>

*p < .01
Ho₃. The null hypothesis stated that there would be no significant difference between posttest mean scores for the experimental and the control group on the McGraw Hill Prescriptive Reading Inventory, Level A, subtests for critical thinking. The statistical data in Table III shows the results of the analysis of covariance.

### TABLE III

**ANALYSIS OF VARIANCE OF POSTTEST SCORES ON THE McGRAW HILL PRESCRIPTIVE READING INVENTORY**

<table>
<thead>
<tr>
<th>Source</th>
<th>N</th>
<th>Mean</th>
<th>df</th>
<th>Square</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group</td>
<td>30</td>
<td>35.233</td>
<td>1</td>
<td>173.842</td>
<td>0.2154* (n.s.)</td>
</tr>
<tr>
<td>Control Group</td>
<td>30</td>
<td>34.500</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comparison of Experimental and Control Groups</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Not significant
There was no significant difference between the posttest mean scores for the experimental and the control group. Consequently, the null hypothesis was accepted. Although both the experimental and the control group showed a significant (.01) difference between pretest and posttest scores, the difference in the means between the two groups on the posttest was not significant.
ANALYSIS OF THE DATA

When the subjects in the experimental group were compared with those in the control group on the subtests for critical thinking, the experimental group learners, while having somewhat higher posttest mean scores, did not significantly outperform the control group when an analysis of covariance was applied. An insufficient number of learning sessions may have also contributed to the findings in this investigation. A possible explanation for the results indicated in the present study may be the students' lack of experience in answering questioning that call for higher level thinking.

Research has found that about two thirds of teacher comprehension questions seek recall answers (Guszak, 1967) (Mueller, 1972). Further research suggests that recall level questions are most often concerned with minute facts. Higher level questions such as those involving analysis, synthesis, and evaluation constitute fifteen percent of teachers' questions (Guszak, 1967). Smith's study (1967) concluded that teacher's questions are important determinants of the manner in which students read. Such findings facilitate the development of inferences relating to critical thinking skills.

The current investigation suggests that the ability to answer comprehension questions may be affected by the type of questions
asked. Direct recall items seemed to cause the least difficulty in both the control and the experimental groups. The most difficulty in the experimental group seemed to be related to items calling for analysis and synthesis. Additional practice seems warranted in answering higher level questions, thus implying that a more extensive training period is called for.

The predominance of direct recall questions in much classroom interaction suggests that any question must have a visible answer directly stated in the text. Pupils thoroughly conditioned to respond with easily verifiable 'right answers' may have a tendency to refrain from bolder attempts to speculate, to inquire, to test out the possibilities of understanding that go beyond literal meaning. One aspect of the study which caused protest and difficulty from the students involved the presentation of questions which require answers not directly stated in the story. Higher level questions caused the subjects in both the control and experimental groups to question their understanding of the story material, especially during the first and second sessions of the study. This served as evidence to support the position that the students were accustomed to being questioned at the recall level.

Teachers often fall into the habit of preparing questions which rely solely upon easily verifiable answers. Such items are easier to write than higher level comprehension questions. These types of
questions are either 'right' or 'wrong'. Teachers may frequently rely upon lower level questions, but after inservice training in question asking techniques with higher level questions, it was found that teachers increased their use of higher level items in their instructional practices (Derhammer and Cormier, 1972).

The results of the present study seem to indicate that further focus in the development of critical thinking skills in the classroom needs to be emphasized in curriculum planning. If pupils are to increase their ability in higher level thinking skills, they must have directed practice in doing so (Taba, 1965). Guidance in the development of higher level comprehension involves the use of questions that widen the range of possible responses. Focus upon the ability to note relationships, to predict consequences, and to substantiate judgments with a statement of the reasons for them seems warranted. Varied experiences and practice in answering higher level questions probably are necessary in the development of critical thinking skills.
Chapter five presents the summary, evaluation of procedure, conclusions, and recommendations for further study.

SUMMARY

This study investigated the effects of teachers' higher level oral questions on the critical thinking of third-grade subjects.

The significance of the present study was based on the premise that the treatment (training in critical thinking for the experimental group) would significantly improve skills in higher cognitive levels of thinking. It has been noted that there appear to be few research studies concerning effective instruction in the development of critical thinking.

The subjects were sixty third-grade students from a lower socioeconomic community in Los Angeles. The subjects were randomly assigned to an experimental and a control group. Both groups read
the same five stories in the Houghton Mifflin reader Dinosaurs (1971). Following the silent reading of a story, the control group was asked oral questions requiring literal comprehension, interpretative thinking, and evaluative and creative thinking that were based on material appearing in the teacher's text of Dinosaurs. The experimental group read the same five stories but after their silent reading of a story, they were asked oral teacher-made questions representing Bloom's (1956) cognitive levels of comprehension, application, analysis, synthesis, and evaluation.

A pretest-posttest research design was employed in this eight week study. The subtests for Interpretative and Critical Comprehension of the McGraw Hill Prescriptive Reading Inventory, Level A, were the research instruments used as the dependent variable. The t-test for correlated data was applied to test hypotheses one through three. In each instance the level of significance necessary to reject the null hypothesis was set at the .01 level. Each hypothesis was treated independently.

Null hypothesis 1 was rejected. Pretest-posttest differences were significant for the experimental group. The experimental subjects made significant gains on the Interpretative and Critical Comprehension subtests of the McGraw Hill Prescriptive Reading Inventory, Level A.
Null hypothesis 2 was rejected. There was a significant difference in the pretest-posttest critical thinking achievement mean scores for the control group. The control subjects made significant gains on the subtests for Interpretative and Critical Comprehension of the McGraw Hill Prescriptive Reading Inventory, Level A.

Null hypothesis 3 was not rejected. There was no significant difference between the posttest mean scores for the experimental and control group on critical thinking skills on the subtests for Interpretative and Critical Comprehension of the McGraw Hill Prescriptive Reading Inventory, Level A.

**EVALUATION OF PROCEDURES**

The Houghton Mifflin reading series was selected for its high interest story content and its colorful illustrations. During the learning sessions of the present study, subjects in both the experimental and control group expressed their enjoyment of several of the stories they read.

After the silent reading of each story, the oral questions provided practice in critical thinking. The use of these types of questions provided exposure to higher level comprehension skills.
As the study progressed, facility in answering questions of a higher cognitive level increased measurably.

The students read each story silently without any instruction for the vocabulary presented. If the subjects were unable to decode a particular word, they were encouraged to ask for assistance from a person sitting near them. This activity promoted independent word attack whenever possible.

The research instrument, the McGraw Hill Reading Inventory, Level A, was selected because the publisher's claim, that two of its subtests assess critical thinking, seemed warranted. In addition, the McGraw Hill Reading Inventory, Level A, included an appropriate reading level for the subjects in this investigation. The directions for the test were clearly stated with no time limit for completion of each section of test items.

Due to the number of subjects needed in this study, it was necessary to select students from four classrooms. Because of other commitments by the individual classes, coordination of the weekly meetings with each group became burdensome at times. For example, a school assembly, a school journey, and excessive student absences all contributed to the postponement of instruction sessions throughout the present study. In spite of this difficulty, however, there
was positive feedback from the classroom teachers involved in this investigation. Their comments included enthusiasm for instruction in critical thinking skills and for the students' exposure to supplementary reading materials that promoted interest and stimulation.

CONCLUSIONS

From the results of the present study, the following conclusions are drawn:

1. Teacher's higher level questions appear to have facilitated gains in critical thinking for subjects in both the experimental and control group.

2. The investigator's explanation for the purpose of the present study may have aroused awareness among the participating teachers for instruction utilizing higher cognitive levels. This conclusion is supported by the results of Taba, Levine, and Elzey's work (1964) which indicated that teachers, once made aware of levels of questioning, may facilitate the growth of critical thinking skills through direct and guided instruction.
3. The amount of time spent during each session of this study may not have been enough to affect significant post mean scores on critical thinking. Additional practice appears warranted. As the study progressed, ease in answering the higher level questions, seemed to increase. The findings of Hansen and Lovitt (1976) suggest that with increased student exposure to higher level questions, facility in responding to these types of items appears to enhance students' critical thinking skills.

4. The results of the present study support the findings of Guszak (1967) and Mueller (1972) that emphasis placed on recall questions in most classrooms may have attributed to the initial apprehension and difficulty in responding to questions using critical thinking skills.
RECOMMENDATIONS FOR FURTHER STUDY

The following recommendations may lend themselves to further research:

1. A different testing instrument might be used profitably to verify the results of the present study. Assessment of critical thinking can be subjective, thus suggesting that another evaluation measure would be helpful.

2. Some longitudinal studies should be made to determine whether the measured effects were lasting or only temporary.

3. The present study should be replicated to verify the results found in this investigation.
BIBLIOGRAPHY


APPENDIX

LISTS OF TEACHER-MADE HIGHER LEVEL QUESTIONS
1. What was Pam's first clue about her part in the play? Her second clue? Her third clue? (Comprehension)

2. Why was Mother so surprised when Pam told her that she was going to be the biggest one in the play? (Comprehension)

3. What might have happened if Pam hadn't given the clues about her part in the play? (Application)

4. How did Billy know how to look for Pam when she was on the stage? (Analysis)

5. If you were Pam, what clues would you have used to tell about your part in the play? (Synthesis)

6. How do you think Pam felt about having a part in the school play? Why do you think so? (Evaluation)
Story #2 - (pp. 13-25)

1. Why did Ted want to walk big and little dogs? (Comprehension)

2. Why did Mrs. Way think that Chester was a boy? (Comprehension)

3. After seeing how Chester behaved, do you think that all big dogs act that way? Why or why not? (Application)

4. What makes you think that Ted knew how to get Chester out of the middle of the street? (Analysis)

5. If you were Mr. Green, how would you have trained Chester to walk? (Synthesis)

6. After reading this story, do you think it was right for Ted to change the sign for walking dogs? Why or why not? (Evaluation)

Story #3 - (pp. 27-38)

1. What did Pam, Ted, and Ken do first at Fun Park? Next? After that? (Comprehension)
2. What did Pam mean when she said, "Ted and Ken are the lucky ones"? (Comprehension)

3. What might have happened if Pam hadn't gone with the boys to Fun Park? (Application)

4. What makes you think Pam's idea of getting back was a good one? (Analysis)

5. If you were Pam, Ken, or Ted, and you had gotten lost, how would you have found your way back? (Synthesis)

6. At the end of the day, do you think that Pam felt important? What makes you think so? (Evaluation)

Story #4 - (pp. 39-49)

1. What did the first treasure card say? The next card? (Comprehension)

2. Why did Ken think that he didn't have to know how to read in order to play the treasure hunt game? (Comprehension)
3. After reading this story, what do you think Ted will do before he plays another treasure hunt game? Why? (Application)

4. What makes you think that Ted lost the treasure hunt game? (Analysis)

5. If you were Pam, what prizes would you have in the treasure hunt game? (Synthesis)

6. Do you think Ted changed his mind about reading at the end of the story? What makes you think so? (Evaluation)

Story #5 - (pp. 51-59)

1. What did Ken and Mike paint first? Next? After that? (Comprehension)

2. What did Mike mean when he said, "Red is a good color for the fence"? (Comprehension)
3. What might have happened if Ken hadn't spilled paint on the doghouse? (Application)

4. Why do you think Dad wanted to paint the boys red? (Analysis)

5. After seeing what happened when Ken was painting, what would you do to be more careful? (Synthesis)

6. Do you think "Red is Nice" is a good name for the story? Why or why not? (Evaluation)