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ABSTRACT

This study examined the types of questions teachers are asking in their classrooms to help promote critical thinking. To do this, 12 teachers representing kindergarten through fifth grade were asked to tape record 3 reading lessons. The lessons were examined and a tally was taken as to the types of questions asked: lower-level or higher-level. The results indicated that teachers are varying the types of questions asked to aid their students' critical thinking. The total percentage of the higher-level questions was significantly higher than the percentage of the lower-level questions. (Contains 2 tables of data and 50 references.) (Author/NKA)

QUESTIONING AT THE ELEMENTARY LEVEL

by

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ABSTRACT

This study examined the types of questions teachers are asking in their classroom to help promote critical thinking. To do this, twelve teachers representing kindergarten thru the fifth grade were asked to tape record three reading lessons. The lessons were examined and a tally was taken as to the types of questions asked: lower-level or higher-level. The results indicated that teachers are varying their types of questions asked to aid in their students critical thinking. The total percentage of the higher-level questions were significantly higher than the percentage of the lower-level questions.

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Questioning has been, and is, a dominant method of instruction in the classroom. Some say questioning is, in fact, the most important teaching technique in use today. The greatest attribute of questioning is that it stimulates thinking in the classroom.

Questioning is the strongest tool the teacher has for teaching students to think. Questions direct the student step by step through the process of concept formation or problem solving. A teacher can raise the level of critical thinking and aid children in reflective thought by using questions properly (Rhoades, 1980). However, in many classrooms, the variety of thinking tasks required of students is limited, and may often be restricted, to nothing more than recalling memorized information (Davis and Tinsley, 1967; Gallagher and Aschner, 1963).

Researchers, Rothkopf (1967) and Frase (1968), consider questions as an important form of instructional intercourse because they act as motivational stimuli and have arousal and associative outcomes. Questions are a major force in shaping the nature of students' thought and methods of inquiry (Chaudhari, 1975).

One of the most important rewards of learning, according to Bruner (1959), is the learner's ability to use the knowledge acquired to further his own thought. Making a connection between learning and thinking requires a large amount of energy, and the process usually has to be incited by questions that go beyond what has been learned (Chaudhari, 1975).

A teacher can greatly influence the level of thinking by his or her pupils. This offers genuine hope for improved instruction in critical thinking. Critical thinking is defined as a thinking processes that goes beyond recognition or recall of factual data (Davidson, 1969).

To aid in the use ofpquestioning strategies there are question classification systems. The most popular system for classifying questions is Bloom, Englehart, Furst, Hill, and Krathwohl's (1956) Taxonomy. Otherwise known as Bloom's Taxonomy. This taxonomy has proven to be a valuable tool in designing, conducting, and evaluating classroom instruction (Mansion, 1970). A teacher is able to use the taxonomy to determine with a reasonable degree of accuracy the kinds of intellectual activities he or she is requiring of his or her students especially on the type of questions ask (Mansion, 1970). Bloom's Taxonomy has six levels of cognitive processing. They are knowledge, comprehension, application, analysis, synthesis, and evaluation. To examine issues concerning questioning, it is best to divide Bloom's Taxonomy into lower-order and higher-order questioning (Marzano, 1993). Lower-order questions derive from the knowledge and the comprehension levels of Bloom's Taxonomy. The other levels of Bloom's Taxonomy belong to the higher-order questions.

Arnold, Atwood, and Rogers (1974) investigated the kinds of questions teachers ask. A consistent finding in the studies

was that roughly three-fourths of the questions require only recall of information were asked. This leads the researchers to believe that children today are not being asked to think critically in the classroom. This type of thinking is essential for the children's future endeavors.

Questioning is the most frequently used method in the classroom that enhances thinking. However, teaching thinking twenty years ago was done by a small number of individuals and organizations. Now, it is penetrating the discussions of educational reform.

HYPOTHESIS

Even though much discussion on the topic has taken place, more evidence on what teachers currently do is desirable. Have they modified that behavior to include critical thinking? To what extent? To add such evidence, the following study was undertaken. It was hypothesised that teachers are not asking specific questions in a way that will promote critical thinking.

PROCEDURES

During the span of four weeks, twelve teachers were asked to tape record their reading presentation of three lessons presented to their students. The teachers represent kindergarten thru the fifth grade level. There were two teachers per a grade level. The teachers' experiences range from first year teaching to having more than twenty years in the classroom.

After the fourth week, the tapes were collected. The examiner then listened to them. While listening to the tapes, a tally sheet was kept to record how many of the two types of questions were asked, respectively. The categories or types of questions of the tally sheet were: lower-level and higher-level questions.

The data was analyzed to determine if the samples of teachers asked a variety of questions from kindergarten thru fifth grade.

RESULTS

The number of the types of questions asked during three reading lessons presented by twelve teachers asked to participate in this study is revealed in Table I.

Table I

Total number and percentages of questions asked by 12 teachers during reading lessons

	Number of Questions	Percentage
Lower-level	305	38%
Higher-level	492	62%
Total	797	100%

As shown in Table I, the majority of the questions asked were of the higher-level type. The percentage of the higher-level questions was considerably higher than the percentage of the lower-level questions.

In Table II, the number of each type of questions asked by a specific grade level is shown. In each grade level, there were more higher-level questions asked than lower-level questions. Overall, 62% of the total questions asked were higher level questions. Kindergarten asked the least amount of questions and also had the lowest percentage (56%) of higher-level questions

asked. The third grade teachers asked the most questions with a total of 167 questions.

Table II

Number of each question type asked by grade level

	Lower-Level	Lower-Level Percentage	Higher-Level	Higher-Level Percentage	Total Number of Questions
Kindergarten	39	44%	50	56%	89
First Grade	67	41%	96	59%	163
Second Grade	48	40%	73	60%	121
Third Grade	60	36%	107	64%	167
Fourth Grade	61	40%	91	60%	152
Fifth Grade	30	29%	75	71%	105

The percentage of higher-level questions increased in each grade level with the exception of fourth grade. As can be seen from Table II, the fifth grade asked the highest percentage of higher-level questions with 71%.

CONCLUSIONS AND IMPLICATIONS

The results of this study do not support the hypothesis that teachers are not asking specific questions in a way that will promote critical thinking in their students. Therefore, the hypothesis was rejected. The overall data from this study showed that teachers are varying their types of questions asked to aid their students critical thinking.

The implications of this study is that teachers, as a whole, are using the skill of thought-provoking questions to induce critical thinking. Kindergarten teachers are aware of the need to expose their students at a young age to higher-level questions. In fifth grade, teachers are cognitive of how important it is to have students subjected to questions that make them critically think. Unfortunately, this study did not reveal that all the teachers in the grades have the same belief to emphasize more higher-level questions to promote their students critical thinking skills as the students go through the different grade levels.

Although, the results of this study are positive, more investigations on critical thinking can be done. Investigators can analyze the type of questions teachers have in their teacher's manual for a particular reading series to analyze if the particular reading series is providing teachers with more lower-level questions

or more higher-level questions or, an equal amount of the both types of questions to ask their students in the different grade levels. By furthering the investigations on critical thinking, one can hope that students are continuously being expose to that type of thinking.

RELATED RESEARCH: TEACHER'S QUESTIONING TECHNIQUES

For more than half a century, the use of questions in the classroom has been the subject of concern for instructional method as well as for empirical investigation. The majority of these questions have emphasized recall, more than any other activity, and have provided very little opportunity for students to engage in a variety of processes which involve thinking. In today's society, schools, and youth can no longer afford an education system which continues to report that the questions it uses demand little more than recall of past knowledge by its students (Tinsley, 1973).

Since the 1980's, the educational community's focus has shifted from teaching basic skills to teaching higher level thinking skills. The most recent report released by the U.S. Labor Department, What Work Requires of Schools- A Scan Report for America 2000 (1992), makes known the foundation skills students must possess prior to entering the work force. The report describes thinking skills as the ability to learn, to reason, to think creatively, to make decisions, and to solve problems, and sees such skills as critical for success in the high-tec work place of the future (Sherman and Wright, 1996).

Historically, research into classroom behavior reports that 80% of classroom interactions are devoted to asking, answering, or reacting to questions that call for only a superficial understanding of the content (Stevens, 1912; Davis and Tinsley,

1967). The Report of the commission of Reading suggests that, as a general rule, questions should be designed to motivate children's higher level thinking (Anderson, Hiebert, Scott, and Wilkerson, 1985).

Hunkins (1972) theorized that questions blended into strategies have two very important, interrelated, instructional functions; centering and expansion. The centering function of a question strategy strives to direct the student's focus on a specific skill such as characterization, theme, details, sequence, setting, plot, mood, purpose, etc... All of this aids in developing reading comprehension skills and processes. The function of the expansion strategy is to lead a student's thought processes to higher cognitive levels. Having an emphasis on expansion in question strategies will move the student's thinking from literal understanding of textual information to creative use of the information.

As Meredith Gall has discovered, "Research indicates that teachers' questions have emphasized facts...(even though) educators generally agree that teachers should emphasize the student's skill in critical thinking rather than in learning and recalling facts" (Gall, 1972). Researchers Hyman and Gall both agree that teachers should ask questions of fact so that they can bring out the basic information students need for answering higher-order questions. The problems lie in the teachers depending too much on the literal

questions or they do not follow through on their plans to ask higher order questions (Gall, 1972).

To teach students to perform higher-level comprehension tasks such as acquiring and systematically arranging information, distinguishing relevant from irrelevant information, deciding how to use data, and detecting cause and effect, is a major goal of reading instruction, according to outcomes stated at both state and local levels. Having this goal be obtain, however, is questionable given the fact that elementary students primarily receive decoding and literal comprehension opportunities with basal readers (Risner and Nicholson, 1996). A majority of teachers in elementary schools follow the dictates of published reading programs that emphasize isolated skill activities aiming at decoding, vocabulary, and literal comprehension (Palmer, 1982). As Samuels and Farstrup (1992) stated, "often the teacher's role is primarily that of a technician who follows directions and prescriptions, rather than a decision-maker who engages in substantive predagogical maneuvering in response to students' needs. However, drill and practice instructional models are inadequate for the new comprehension curriculum. This is especially true in a technological society- a society that will increasingly value workers who can solve problems over those who can follow prescribed routines. It is no longer good enough to have students answer literal questions and memorize isolated skill responses."

In Hollingsworth's article, Questioning: The Heart of Teaching, which explains the importance of critical thinking. He believes a teacher can raise the level of critical thinking and aid children in reflective thought by the proper use of questions. By practicing, teachers can improve his or her questioning techniques in their classroom, and thus improve the level of learning in the classroom. Many times, teachers apply inappropriate questions that do not develop reflective thought. Through the artful use of questioning techniques, critical thinking is encouraged. The tendency to emphasize recall only has been the foremost problem associated with questioning techniques. These types of questions offer the security of providing "right" answers but, unfortunately, recall items by themselves offer no assurance of critical thinking. A reasonable rule of thumb for the classroom teacher is that a minimum of one-third of the time might be spent to questions above the memory or recall level. Besides the type of questions teachers ask, there is another problem with the questioning techniques. Much too often, there is a tendency to rush the student response to the question. A rapid type of thinking which is imcompatable with critical thinking processes is encouraged. Teachers must be aware that critical thinking takes time (Hollingsworth, 1982).

Research covering more than a half-century reports that teachers' questions have emphasized facts. In 1912, Stevens

investigated teachers' questions. This was one of the first studies done on questions. She stated that for a sample of secondary-school classes varying in subject and grade level two thirds of the teachers' questions required direct recall of textbook information. Studies conducted in the past years report that questioning practices have not changed. In two separate studies executed in elementary schools about 80% of the questions that were asked required memory of facts (Galloway and Mickelson, 1973). In 1970, Galloway and Mickelson conducted two pilot studies and discovered similar findings as above. From 70% to 80% of the questions asked by experiment classroom teachers of children in elementary and secondary schools wanted only the recall of facts. There appears to have been little, if any, change in the types of questions teachers ask in the classroom for more than a half-century (GAlloway and Mickelson, 1973).

Sanders devised a hierarchical, non-context bound question classification system. His rationale for this system was that "far too many teachers overemphasize those questions which require students only to remember and practically no teachers make full use of all worthwhile kinds of questions." He recommended that teachers to use many different types of questions to insure a "varied intellectual atmosphere in the classroom." He infered that higher level questions would stimulate development of cognitive

abilities beyond memorization and on to critical thinking (Sanders, 1966)

Researchers developed various systems of classifying questions in order to study the verbal behavior in the classroom. By doing this, it implies that there are several types of questions which teachers may ask. The objectives the teachers wish to accomplish determines the appropriateness of the types of questions used. However, while statements of educational objectives are permeated with expressions of intentions to develop higher levels of thinking, results of research indicate that such objectives are not being attained (Bartolome, 1969).

According to Bartolome, teachers questions in reader can foster certain modes of thinking such as anlyzing an argument, plot structure or explanation; comparing reports, editorials, two characters; or evaluation the style or worth of the written material (Bartolome, 1969).

Bartolome conducted a study to examine and categorize the questions posed by teachers in relation to the objectives for primary reading lessons. From the 108 lesons observed the total number of questions recorded was 7,476. The total number of questions recorded were categorized according to Bloom's taxonomy. The results showed that 47.54% were classified as memory, 3.45% at the knowledge level, 9.08% at the interpretation level, 2,29% at the application level, 25.94% at the analysis level, 9.16% at

the synthesis level, and 2.55% were classified at the evaluation level. This investigation proves how imperative it is for teachers to develop their skills in using strategies of teaching that will induce higher levels of thinking; one of which is the asking of thought-provoking questions (Bartolome, 1961).

Guszak did a study on questions asked by a teacher in a reading group. His major finding was that 70% of the questions asked by teachers in reading groups were at the recall or recognition level. In the study's conclusion, Guszak had expressed concern that too many teachers' questions were involved with the retrievel of the trivial factual make up of stories. His rationale for this study was his observation that "teachers appear to equate reading-thinking skills with the most narrow of literal comprehension skill" (Guszak, 1967).

In 1972, Ruddell replicated Guszak's study of questions asked by a teacher in a reading group but used a different questioning classification system. The study came out with two significant findings. The first finding was that 70% of the teachers' questions asked during a reading lesson were at the factual level. This finding helped support Guszak's findings and recommendations that teachers need to ask more higher level questions in reading groups. The second finding from the study was that 86% of the children's responses to the teacher's questions were at the factual level. From these findings, Ruddell determined that many children were

not able to handle higher level questions and recommended that "questioning strategies used by the teacher must be designed with sensitivity to child response levels and strategies" (Ruddell, 1978).

Two suggestions for training preservice teachers may come from questioning strategies described above. First, Guszak's findings indicate attention should be paid to the quality of the questions within each category. Second Ruddell's study indicates the need of teachers to become aware of students' readiness to respond to higher level questions (Frager, 1979).

Lori Korinek (1987) did a study to examine and describe the types of qeusitoning strategies used by teachers on an elementary level. She states, several researchers have realized that quesitoning sessions provide students with oppourtunities to become actively involved in instruction. Teacher-directed instruction, where involvement is higher, shows a positive correlation to increase student achievement. Hence, questioning interactions supply the occasion for teachers and students to "engage in optimal learning behaviors." The data from the study reveals that half of the questions asked by the participating teachers involved recall of factual information and only one-fourth of the questions required the use or application of information. It is fascinating that in the study, these teachers almost never asked students to

"amplify, elaborate upon, or evaluate other students' ideas" (Korinek, 1987).

A study conducted by Risner and Others examined the levels of comprehension generated by questions in story-related and story-retell acitvites in the Coopertive Integrated Reading and Composition (CIRC) program. A sample of 500 questions were randomly selected. Three raters independently classified the 500 questions from the story-related or story-retell questions in the levels of literal, infrerential, or evaluative comprehension. The data showed that the literal category received the majority of story-related and story-retell questions that accompany CIRC materials. The overall percentage revealed 61% of the questions dealt with literal comprehension, 28% dealt with inferential, and only 11% of the questions fell into the evaluation category. This data showed that students are exposed to a preponderance of literal comprehension questions when using the story-related and story-retell activities. Data in this study suggests that students can answer the qeustions that accompany the story with little or no true understanding of the elements involved. A more logical progression, through all the levels of questioning and more attention to inference and evaluation, is required when developing higher levels of comprehension, while engaging a reader with a story (Risner; and Others, 1994).

Young and Daines (1992) conducted a study to compare and analyze teachers' prequestions about expository text. The sample for this study consisted of two randomly selected teachers from each grade levels (K-5) in an elementary school. The results of the study revealted that 54% of teachers prequestions were literal-level questions. Having a large proportions of literal questions may be due to the nature of objectives in school curricula (Young and Daines, 1992). School curricula objectives are primarily at a lower cognitive level and that is why teachers may ask more lower-level questions (Gall and Rhodes, 1987). Whatever the reason may be for teachers asking literal questions, the results are consistent with previous research that concluded that the majority of questions that teachers ask are at a literal level (Daines, 1986; Gall, 1984).

The use of questioning has long been used to facilitate learning (Mevarech and Susak, 1993). Research has shown that children's questioning does relate to cognitive outcomes in several ways (Wong, 1985). Frase and Schwartz (1975) conducted a study and found that students who generated higher cognitive questions recalled the information presented in the text better than did students who learned the text in order to be tested on it. Although it is important for children to generate their own question either as a cognitive skill or as a means for improving achievement, reading comprehension, and creative thinking, research has shown that overall children's questioning skills are poor. In a study

done by Stano (1981), Stano obtained that 75% of students' questions were factual questions, 21% referred to comprehension, 3% required application and analysis, and only 1% were classifying and evaluative questions. Three factors may be the reason for these findings. First, schools rarely stress children's self-generating questions and thus, students rarely learn those skills. Second, children are subjected to mainly lower cognitive questions generated by the teacher (Soled, 1986), and so they do not have an appropriate model to imitate. Third, students often pause to ask questions (Mevarech and Susak, 1993).

Mills, Rice, Berliner, and Rosseau reanalyzed the data from a previous study of teacher questioning carried out by Gall (1970) for their investigation. The first group of studies render important background information about questions and the cognitive classification systems that were used to study qeustions. From these studies, some of the most notable conclusions and recommendations are: (a.) the basic unit underlying classroom teaching is teacher questioning; (b.) questions at a lower cognitive level are asked by a great majority of teachers; (c.) in order to foster higher intellectual thought in their students, teachers should increase the intellectual levels of their questioning; (d.) an useful training device for developing teacher questions strategies that maintain higher cognitive levels is the cognitive classification systems.

The second group of studies examined the relationship between the use of higher order questions and student achievement outcomes. One conclusion attained was that students who have been subjected to higher cognitive questioning experiences recieved higher achievement scores than students who had not been so exposed.

The relations between special instructional settings and the use of higher order questions were studied in the third group. The focus of these studies were on the process-oriented in content-oriented social studies classes and reading classes. In both classes, teacher questioning was at the low intellectual levels, predominantely requiring recall and memory.

In the fourth group, the studies investigated the effects of special training on increasing teachers' use of higher cognitive questions. Teachers were trained with various approaches which included a five-week minicourse, eight weekly individual and group sessions, several daily seminars, and one two hour seminar. The investigators found in all cases that the levels of questioning for trained teachers were significantly higher than those for untrained teachers.

The last group of studies, analyzed relations between teacher questions and student answers. Some of the conclusions drawn from these studies include: (a.) teachers trained in higher order questioning will ask their students significantly more of this type of questions than will untrained teachers and (b.) students

of trained teachers will give significantly more higher cognitive answers than will the students of untrained teachers (Mills, Rice, Berliner, and Rosseau, 1980).

Crowell and Hu-Pei Au report the use of a scale of questions may be particularly useful in curriculum design because it helps teachers to remember that children should be encouraged to use and develop their comprehension skills at a variety of cognitive levels, from a very early age. Children would develop the skills needed in dealing with questions at levels beyond their present competence level (Crawell and Hu-Pei Au, 1981).

Joseph Riley did a study on the cognitive level of questioning and its effect on pupil achievement. He discovered that if a teacher wants students to achieve comprehension level objectives, a combination of low and high cognitive questions appear more effective. However, if knowledge level objectives are what a teacher wants the students to achieve, low cognitive level questions appear to be more effective (Riley, 1986).

Zahorik drew a couple of conclusions from studies and statements concerning teachers questions that he researched. First, teachers ask many low level questions and few high level questions in all subject areas and at all grade levels. The second conclusion is that teachers ought to increase their use of asking higher level questions while asking fewer low level questions (Zahorik, 1971).

An increasing growth of evidence suggests that the majority of classroom and textbook questions require little more than memorized responses (Chaudhari et at, 1972). Studies have displayed that nearly 60 to 90 percent of the questions asked in classrooms and set forth in textbooks never take the learner beyond the lowest cognitive process of Bloom's Taxonomy (Bloom, 1956). Despite the high-level objectives often revealed in the curricula of various subjects, students are rarely asked to apply, analyze, synthesize or evaluate the body of facts, concepts or generalizations they study (Chaudhari, 1975). Chaudhari conducted a study where 711 end-of-lesson questions of the Nationalized Hindi Textbooks of Madhya Pradesh were classified into different cognitive categories of Bloom-Sanders Taxonomy. He discovered that 51.48% of the questions were at memory level, 11.6% were above memory (translation and interpretation), 10.04% at convergent thinking (application and analysis), and 2.10% at divergent thinking (synthesis and evaluation) level (Chaudari, 1974).

According to Mueller's study of the level of thinking fostered by the teacher's guide of the basal readers, an analysis was made of a sample of 850 questions taken from those provided in the teacher's guide of the two basal readers. Her findings were that an overwhelming majority of the questions from both texts were of the closed type, tightly structured and requiring a specific answer. There was only a small percentage of the questions that

were open to multiple acceptable responses and demanded a higher level of thinking (Mueller, 1971).

Ryan (1973) performed a study to prove when students are exposed to higher-order thinking, they will be able to apply it. He felt that a main thrust of the research done on questioning has focused on such characteristics of teacher questioning practiices as the number of questions asks over a period of time, the amount of teacher versus student talk in the classroom, and the levels of teacher questioning. However, there is little research which reflects an examination of the crucial issue of whether a significant relationship exists between the kinds of questions asked by teachers (low level, high level) and any resultant student behavior. Therefore, Ryan conducted a study to ascertain the differeance, if any, in high level and low level achievement among three groups of students. A 104 students were reandomly assigned to one of the three groups; high quesitoning, low questioning, and control groups. Each group received nine daily lessons to be utilized on consecutive school days. The results of this study suggest that high level questions are more efficient than low level questions for moving students toward low and high level understandings (Ryan, 1973).

In an efort to determine the levels of comprehension generated by questions accompanying the stories in new basal readers, Risner and Nicholson (1996) completed an analysis of the questions. The

study searched to see if a statistically significant difference existed between the number of literal and above literal level questions. The sample consisted of 200 questions from two new basal readers for grade 3, with 100 questions coming from each basal reader. The questions were classified by three raters independently. The reaters grouped the questions into three comprehension categories: literal, inferential, and evaluation. The data of the study indicates that the majority of story related comprehension questions that accompany the new basal series were classified in the inferential category. The percentages overal revealed 71% of questions dealt with inferential, 17% dealt with evaluation, and only 12% fell into the literal category. When the two new basal readers were analyzed separately, the two series yield remarkably similar results that highlight a dramatic change in the new basals. The two new basals contained a total of 87% and 88% above-literal comprehension questions. This study shows an exciting and surprising shift in the comprehension emphais contained in the new basals. Today, the trend has reversed dramatically, and these data show the new basals contain meaning-centered teaching strategies and meaning-centered questioning that correlate with the methods (Risner and Nicholson, 1996).

Research has confirmed that the type of question used by teachers strongly affects what children learn to think about while

reading. If the teacher's quetioning emphasises literal details, then children learn to attend to details as they read (Anderson, 1985). Studies have shown that making inferences and evaluations result in improvement in critical thinking without loss in higher-level comprehension (Risner and Nicholson, 1996).

"Schools of the future will be designed not only for 'learning' but for 'thinking.' More and more insistently, today's schools and colleges are being asked to produce men and women who can think, who can make new scientific discoveries, who can find more adequate solutions to impelling world problems, who cannot be brainwashed--men and women who can adapt to change and maintain society in this age of acceleration" (Torrance, 1967). It seems apparent that teaching should include higher-order questions to promote critical thinking so children can reach the above goal.

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