Classroom Questioning

Kathleen Cotton

Introduction

Articles on the subject of classroom questioning often begin by invoking Socrates. Researchers and other writers concerned with questioning techniques seem to want to remind us that questioning has a long and venerable history as an educational strategy. And indeed, the Socratic method of using questions and answers to challenge assumptions, expose contradictions, and lead to new knowledge and wisdom is an undeniably powerful teaching approach.

In addition to its long history and demonstrated effectiveness, questioning is also of interest to researchers and practitioners because of its widespread use as a contemporary teaching technique. Research indicates that questioning is second only to lecturing in popularity as a teaching method and that classroom teachers spend anywhere from thirty-five to fifty percent of their instructional time conducting questioning sessions.

Definition

A question is any sentence which has an interrogative form or function. In classroom settings, teacher questions are defined as instructional cues or stimuli that convey to students the content elements to be learned and directions for what they are to do and how they are to do it.

The present review focuses on the relationship between teachers' classroom questioning behaviors and a variety of student outcomes, including achievement, retention, and level of student participation. This means that certain other subtopics within the general area of questioning are excluded from the present analysis. It does not deal, for example, with the effects of textual questions or test questions, and it is only incidentally concerned with methods used to impart study skills, including questioning strategies, to students.

What are the purposes of teachers' classroom questions? A variety of purposes emerge from analysis of the literature, including:

* To develop interest and motivate students to become actively involved in lessons
* To evaluate students' preparation and check on homework or seatwork completion
* To develop critical thinking skills and inquiring attitudes
* To review and summarize previous lessons
* To nurture insights by exposing new relationships
* To assess achievement of instructional goals and objectives
* To stimulate students to pursue knowledge on their own

These purposes are generally pursued in the context of classroom recitation, defined as a series of teacher questions, each eliciting a student response and sometimes a teacher reaction to that response. Within these recitations, students follow a series of steps (consciously or unconsciously) in order to produce responses to the questions posed. These steps include:

* Attending to the question
* Deciphering the meaning of the question
* Generating a covert response (i.e., formulating a response in one's mind)
* Generating an overt response; and often
* Revising the response (based on teacher probing or other feedback)

The Research on Classroom Questioning

Characteristics of the research

Classroom questioning is an extensively researched topic. The high incidence of questioning as a teaching strategy, and its consequent potential for influencing student learning, have led many investigators to examine relationships between questioning methods and student achievement and behavior.

The findings reported in this summary are drawn from thirty-seven research documents. Twenty-one of these are the reports of experimental or correlational studies, thirteen are reviews, one reports the results of both a review and a study, and two are metaanalyses.

The student populations of concern in these documents are:

* Elementary (mostly intermediate) - 18
* Secondary - 4
* The entire K-12 range - 14
* Not specified - 1

The research is concerned with a variety of treatments. By far the largest number of documents—twenty-six—are concerned with the relative effects on student learning produced by questions at higher and lower cognitive levels (discussed below). The subject of eight of the documents is the relationship between teacher wait-time and learning outcomes (also discussed in a later section). Other treatments include:

* Manipulating the placement and timing of questions during lessons - 2
* Using probing, redirection and reinforcement strategies - 3
* Training students in responding to higher cognitive questions, making inferences, etc. - 2
* Training teachers in questioning strategies - 3

The variables are sometimes investigated alone and sometimes in combination with each other or with other variables unrelated to classroom questioning.

The student outcome areas of concern in the research include:

* General achievement - 18
* Reading achievement (usually comprehension) - 5
* Social studies achievement - 3
* Science achievement - 3
* Mathematics achievement - 1

* Retention, as measured by delayed tests 3
* Level of student engagement/participation -9
* Cognitive level of responses produced by students - 4
* Student attitudes - 2

Research findings

General Findings

Some researchers have conducted general investigations of the role of classroom questioning and have drawn the following conclusions:

* Instruction which includes posing questions during lessons is more effective in producing achievement gains than instruction carried out without questioning students.
* Students perform better on test items previously asked as recitation questions than on items they have not been exposed to before.
* Oral questions posed during classroom recitations are more effective in fostering learning than are written questions.
* Questions which focus student attention on salient elements in the lesson result in better comprehension than questions which do not.

Placement and Timing of Questions

* Asking questions frequently during class discussions is positively related to learning facts.
* Increasing the frequency of classroom questions does not enhance the learning of more complex material. (Some researchers have found no relationship; others have found a negative relationship.)
* Posing questions before reading and studying material is effective for students who are older, high ability, and/or known to be interested in the subject matter.
* Very young children and poor readers tend to focus only on material that will help them answer questions if these are posed before the lesson is presented.

Cognitive Level of Questions

Should we be asking questions which require literal recall of text content and only very basic reasoning? Or ought we to be posing questions which call for speculative, inferential and evaluative thinking? Some researchers have designed experiments which examine the effects of questions framed at differing levels of Bloom's Taxonomy of School Learning. These levels, in ascending order of sophistication, are: (1) knowledge, (2) comprehension, (3) application, (4) analysis, (5) synthesis, and (6) evaluation. There are other hierarchies, too, which are used as the basis for structuring comparative studies.

The majority of researchers, however, have conducted more simple comparisons: they have looked at the relative effects on student outcomes produced by what they call higher and lower cognitive questions.

Lower cognitive questions are those which ask the student merely to recall verbatim or in his/her own words material previously read or taught by the teacher. Lower cognitive questions are also referred to in the literature as fact, closed, direct, recall, and knowledge questions.

Higher cognitive questions are defined as those which ask the student to mentally manipulate bits of information previously learned to create an answer or to support an answer with logically reasoned evidence. Higher cognitive questions are also called open-ended, interpretive, evaluative, inquiry, inferential, and synthesis questions.

Research on the relationship between the cognitive level of teachers' questions and the achievement of their students has proved frustrating to many in the field of education, because it has not produced definitive results. Quite a number of research studies have found higher cognitive questions superior to lower ones, many have found the opposite, and still others have found no difference. The same is true of research examining the relationship between the cognitive level of teachers' questions and the cognitive level of students' responses. The conventional wisdom that says, "ask a higher level question, get a higher level answer," does not seem to hold.

It is only when researchers look at the cognitive level of teachers' questions in relation to the subject matter, the students, and the teachers' intent that some meaningful conclusions can be drawn from this body of research. Findings include:

* On the average, during classroom recitations, approximately 60 percent of the questions asked are lower cognitive questions, 20 percent are higher cognitive questions, and 20 percent are procedural.
* Higher cognitive questions are not categorically better than lower cognitive questions in eliciting higher level responses or in promoting learning gains.
* Lower cognitive questions are more effective than higher level questions with young (primary level) children, particularly the disadvantaged.
* Lower cognitive questions are more effective when the teacher's purpose is to impart factual knowledge and assist students in committing this knowledge to memory.
* In settings where a high incidence of lower level questions is appropriate, greater frequency of questions is positively related to student achievement.
* When predominantly lower level questions are used, their level of difficulty should be such that most will elicit correct responses.
* In most classes above the primary grades, a combination of higher and lower cognitive questions is superior to exclusive use of one or the other.
* Students whom teachers perceive as slow or poor learners are asked fewer higher cognitive questions than students perceived as more capable learners.
* Increasing the use of higher cognitive questions (to considerably above the 20 percent incidence noted in most classes) produces superior learning gains for students above the primary grades and particularly for secondary students.
* Simply asking higher cognitive questions does not necessarily lead students to produce higher cognitive responses.
* Teaching students to draw inferences and giving them practice in doing so result in higher cognitive responses and greater learning gains.
* Increases in the use of higher cognitive questions in recitations does not reduce student performance on lower cognitive questions on tests.
* For older students, increases in the use of higher cognitive questions (to 50 percent or more) are positively related to increases in:

(1) On-task behavior

(2) Length of student responses

(3) The number of relevant contributions volunteered by students

(4) The number of student-to-student interactions

(5) Student use of complete sentences

(6) Speculative thinking on the part of students

(7) Relevant questions posed by students

* For older students, increases in the use of higher cognitive questions (to 50 percent or more) are positively related to increased teacher expectations about children's abilities—particularly the abilities of those students whom teachers have habitually regarded as slow or poor learners.

Wait-Time

Researchers on questioning strategies speak of two kinds of wait-time: "wait-time 1" refers to the amount of time the teacher allows to elapse after he/she has posed a question and before a student begins to speak; and "wait-time 2" refers to the amount of time a teacher waits after a student has stopped speaking before saying anything. The research has focused more on wait-time 1 than wait-time 2, but the following findings apply to both.

Because research has established a positive relationship between the amount of instructional content covered and student achievement, researchers and other educators have recommended that teachers keep up brisk instructional pacing. In this way, the reasoning goes, classes will cover more material, student interest will be maintained, and achievement levels will be higher. As with the research on the cognitive level of teachers' questions, this wisdom turns out to have limited application. Findings include:

* The average wait-time teachers allow after posing a question is one second or less.

* Students whom teachers perceive as slow or poor learners are given less wait-time than those teachers view as more capable.

* For lower cognitive questions, a wait-time of three seconds is most positively related to achievement, with less success resulting from shorter or longer wait-times.

* There seems to be no wait-time threshold for higher cognitive questions; students seem to become more and more engaged and perform better and better the longer the teacher is willing to wait.

* Increasing wait-time beyond three seconds is positively related to the following student outcomes:

  (1) Improvements in the student achievement

  (2) Improvements in student retention, as measured by delayed tests

  (3) Increases in the number of higher cognitive responses generated by students

  (4) Increases in the length of student responses

  (5) Increases in the number of unsolicited responses

  (6) Decreases in students' failure to respond

(7) Increases in the amount and quality of evidence students offer to support their inferences

(8) Increases in contributions by students who do not participate much when wait-time is under three seconds

(9) Expansion of the variety of responses offered by students

(10) Decreases in student interruptions

(11) Increases in student-student interactions

(12) Increases in the number of questions posed by students

* Increasing wait-time beyond three seconds is positively related to the following teacher outcomes:

(1) in flexibility of teacher responses, with teachers listening more and engaging students in more discussions

(2) Increases in teacher expectations regarding students usually thought of as slow

(3) Expansion of the variety of questions asked by teachers

(4) Increases in the number of higher cognitive questions asked by teachers.

Relationship Between Increasing the Use of Higher Cognitive Questions and In-creasing Wait-Time

The list of benefits produced by increasing higher cognitive questions and the list of benefits resulting from increased wait-time are remarkably similar. In addition, research has shown that the degree of improvement resulting from increases in both higher cognitive questions and wait-time is greater than an increase in either of these variables by itself. Indeed, those who have examined the relationship between these factors tell us that, in a sense, they "cause" one another. That is, the more complex mental operations required by higher cognitive questions call for—and are often found to produce—longer wait-times. And increases in wait-time seem to result in teachers and students carrying out recitations at higher cognitive levels.

Redirection/Probing/Reinforcement

The research on questioning includes investigations into the effects of redirecting questions when initial responses are unsatisfactory or incomplete, probing for more complete responses, and providing reinforcement of responses.

These practices have been discussed previously in this School Improvement Research Series. The 1988 "close-up" report entitled Instructional Reinforcement looks at the ways teachers respond to student answers and other student comments, and how the nature of those responses relate to student outcomes. Monitoring Student Learning in the Classroom, also published in 1988, discusses classroom questioning as one of many approaches teachers can use to track student learning. The findings emerging from these investigations are congruent with the general literature on questioning, including:

* Redirection and probing (often researched together) are positively related to achievement when they are explicitly focused, e.g., on the clarity, accuracy, plausibility, etc. of student responses.

* Redirection and probing are unrelated to achievement when they are vague or critical, e.g., "That's not right; try again"; "Where did you get an idea like that? I'm sure Suzanne has thought it through more carefully and can help us."

* Acknowledging correct responses as such is positively related to achievement.
* Praise is positively related to achievement when it is used sparingly, is directly related to the student's response, and is sincere and credible.

Student Attitudes

Reports on most practices investigated by educational researchers include findings about the effects of the practice on student attitudes as well as learning outcomes. Research on the relationship between questioning practices and student attitudes is virtually nonexistent. The only findings emerging from the literature reviewed in preparation for this report include:

* The cognitive level of questions posed is unrelated to students' attitudes toward the subject matter.
* Those students who prefer lower cognitive questions perform better in recitations and on tests where lower cognitive questions are posed.
* Those students who prefer higher cognitive questions perform equally well with higher or lower cognitive questions in recitations and on tests.

Teacher Training

Research tells us that preservice teachers are given inadequate training in developing questioning strategies and, indeed, that some receive no training at all. What happens when teachers participate in training designed to help them improve their questioning skills? Research indicates that:

* Training teachers in asking higher cognitive questions is positively related to the achievement of students above the primary grades.
* Training teachers in increased wait-time is positively related to student achievement.
* Training teachers to vary their questioning behaviors and to use approaches other than questioning during classroom discussions (e.g., silence, making statements) are positively related to student achievement.

Guidelines for Classroom Questioning

Based on the foregoing findings from the research on classroom questioning, the following recommendations are offered:

* Incorporate questioning into classroom teaching/learning practices.
* Ask questions which focus on the salient elements in the lesson; avoid questioning students about extraneous matters.
* When teaching students factual material, keep up a brisk instructional pace, frequently posing lower cognitive questions.
* With older and higher ability students, ask questions before (as well as after) material is read and studied.
* Question younger and lower ability students only after material has been read and studied.
* Ask a majority of lower cognitive questions when instructing younger and lower ability students. Structure these questions so that most of them will elicit correct responses.

* Ask a majority of higher cognitive questions when instructing older and higher ability students.
* In settings where higher cognitive questions are appropriate, teach students strategies for drawing inferences.
* Keep wait-time to about three seconds when conducting recitations involving a majority of lower cognitive questions.
* Increase wait-time beyond three seconds when asking higher cognitive questions.
* Be particularly careful to allow generous amounts of wait-time to students perceived as lower ability.
* Use redirection and probing as part of classroom questioning and keep these focused on salient elements of students' responses.
* Avoid vague or critical responses to student answers during recitations.
* During recitations, use praise sparingly and make certain it is sincere, credible, and directly connected to the students' responses.

Detailed instructions for teaching students to draw inferences is outside the scope of this paper. However, the model offered by Pearson (1985) does provide some basic steps which can help students make connections between what they know and what they are seeking to learn. Pearson suggests that teachers complete all the steps in this process by way of demonstration, then gradually shift responsibility for all but the first step to the students.

1. Ask the inference question.
2. Answer it.
3. Find clues in the text to support the inference.
4. Tell how to get from the clues to the answer (i.e., give a line of reasoning).

Better preservice training in the art of posing classroom questions, together with inservice training to sharpen teachers' questioning skills, have potential for increasing students' classroom participation and achievement. Increasing wait-time and the incidence of higher cognitive questions, in particular, have considerable promise for improving the effectiveness of classroom instruction.

Key References

Adams, J. Refinements in Teaching Comprehension: Who Should Ask the Questions? Paper presented at the Annual Meeting of the Illinois Reading Council, Peoria, IL, March 7-9,1985. (ED 255 874).

Investigates the effects of teaching elementary children about the kinds of questions used in educational settings and how to generate good comprehension questions. Fourteen teachers and their students in grades one through eight participated. Experimental students outperformed controls on standardized tests.

Bozsik, B.E. A Study of Teacher Questioning and Student Response Interaction During Pre-Story and Post-Story Portions of Reading Comprehension Lessons. Paper presented at the Annual Meeting of the American Educational Research Association, New York, March 19-23,1982. (ED 215294).

Compares the questioning behavior of four preservice and four inservice teachers in an inner city elementary school. Also compares the teachers' approaches to questioning high and low ability students.

Bradtmueller, W.G., and Egan, J.B. To Question or Not to Question: That Seems to Be the Question. Paper presented at the Annual Meeting of the Great Lakes Regional Conference of the International Reading Association, Springfield, IL, October 5–8, 1983. (ED 248 492).

Reviews research on the effects of questioning-particularly the level, placement, and timing of questions during reading lessons. Offers guidelines for classroom questioning.

Brophy, J., and Good, T.L. "Teacher Behavior and Student Achievement." In Handbook of Research on Teaching (3rd ed.), edited by Merlin C. Wittrock. New York: Macmillan Publishing Co., 1985.

Summarizes research on classroom practices which are positively related to student achievement. Regarding teachers' classroom questioning strategies, research indicates that (1) most questions should elicit correct responses; (2) higher cognitive questions are not categorically better than lower cognitive questions; and (3) teaching complex cognitive content calls for asking questions that few students can answer correctly (or which have no one correct answer).

Cooter, R.B., and Flynt, F.E. Reading Comprehension: Out of the Ivory Tower and into the Classroom. Paper presented at the Annual Meeting of the College Reading Association, Washington, D.C., October 26-28, 1984. (ED 251 824).

Examines the effects of eliminating literal questions-and asking only inferential questions-on the literal and inferential comprehension of third and fourth graders. Experimental students outperformed controls on both literal and inferential comprehension tests.

Dillon, J.T. "Research on Questioning and Discussion." Educational Leadership 42(1984): 50-56.

Draws a distinction between recitation and discussion and cites research regarding the nature and effectiveness of discussion. Offers recommendations for engaging students in discussions and makes suggestions for further research.

Gall, M. "Synthesis of Research on Teachers' Questioning." Educational Leadership 42(1984): 40–47.

Reviews research on the effects of teachers' questioning techniques and identifies implications of this research for classroom practice.

Gall, M.D.; Ward, B.A., Berliner, D.C.; Cahen, L.S.; Winne, P.H.; Elashoff, J.D.; and Stanton, G.C. "Effects of Questioning Techniques and Recitation in Student Learning." American Educational Research Journal 15(1978):175–199.

Reports the results of two experiments involving the study of ecology by sixth graders (n=336 and n=371). Found that probing and redirection questions had no effect on student achievement, nor did varying levels of higher cognitive questions. Recitation treatments involving scripted lessons were effective in promoting achievement.

Good, T.L., and Brophy, J.E. Looking in Classrooms. New York: Harper & Row, Publishers, 1978.

Focuses on helping teachers and researchers to become better classroom observers and on providing teachers with research-based suggestions to improve their teaching. Includes a section on teacher questioning strategies and their effects.

Hansen, J., and Pearson, P.D. The Effects of Inference Training and Practice on Young Children's Comprehension. Technical Report No. 166. Cambridge, MA: Bolt, Beranek and Newman, Inc.; Champaign, IL: University of Illinois, 1980. (ED 186 839).

Investigates the effects of giving children instruction and practice in making inferences upon their reading comprehension. Twenty-four second graders in a treatment condition and two comparison conditions participated. Practice in drawing inferences enhanced comprehension.

Henson, MT. "Questioning as a Mode of Instruction." The Clearing House 53(1979):14–16.

Provides an overview of research findings on teachers' classroom questioning and provides guidelines for framing and asking more productive questions.

Honea, J.M., Jr. "Wait-Time as an Instructional Variable: An Influence on Teacher and Student." The Clearing House 56(1982): 167–170.

Reports the results of an experiment in which the effects of increasing wait-time were studied. Twenty-four high school students participated in their social studies classes. Increasing wait-time to three to five seconds significantly improved student engagement and participation.

Hoxmeier, E.A. Questioning Techniques for Teachers: Teaching Reading, Thinking, and Listening Skills. Paper presented at the Annual Meeting of the North Central Reading Association, South Bend, IN, October 23-25, 1986. (ED 284 186).

Presents current research on questioning techniques for classroom use. Analyzes different types of questions and provides information on teachers' actual question-posing behaviors. Offers guidelines for classroom questioning.

Hunkins, F.P. "Effects of Analysis and Evaluation Questions on Various Levels of Achievement." The Journal of Experimental Education 38(1969): 45–58.

Studies the relative effects of higher and lower cognitive questions in the social studies text materials of students in the sixth grade. Higher cognitive questions produced significantly higher scores than did lower cognitive questions.

Johnston, J.D.; Markle, G.C.; and Haley-Oliphant, A. "What Research Says About Questioning in the Classroom." Middle School Journal 18(1987): 29-33.

Summarizes research on the effectiveness of recitation and discussion, the use of differing cognitive levels of questions, the effect of questioning on student participation, the usefulness of prescriptions for questioning, and teacher thinking regarding questioning.

Kennon, C.H. Utilizing Moral Dilemmas to Enhance Comprehension. Paper presented at the Annual Meeting of the International Reading Association, St. Louis, MO, May 5–9,1980. (ED 189 548).

Cites research regarding the value of higher cognitive questioning techniques and proposes use of the Cognitive Developmental Approach to Moral Education to foster higher level thinking skills. Presents results of a study involving this instructional approach.

Kleinman, G.S. "Teachers' Questions and Student Understanding of Science." Journal of Research in Science Teaching 3(1965): 307-317.

Investigates the relationship between teachers' questioning techniques and (1) both teacher and student behavior, and (2) student achievement. Seventh and eighth graders in 23 science classes participated. Most significant findings were that (1) all students of teachers who asked predominantly critical thinking questions were more on-task, alert, etc., and (2) higher ability students showed greater improvement with critical thinking questions than similar students asked lower level questions.

Mahlios, M., and D'Angelo, I. Teacher Questions: An Experimental Analysis of the Question Effect Hypothesis. Paper presented at the Annual Meeting of the Association of Teacher Educators, Orlando, FL, February 1, 1983. (ED 227 062).

Investigates the effects of different types of classroom questioning on the nature of student responses, student achievement and student attitudes. Higher order questions led to higher achievement but did not seem to affect attitude measures. Student answers were both longer and at higher levels when they were exposed to higher level questioning.

Mangano, N.G., and Benton, S.L. "Compari son of Question-Response-Feedback Interactions During Basal Reader Instruction." Journal of Educational Research 78(1984):119–126.

Analyzes the classroom behaviors of 18 fourth grade teachers and the reading comprehension scores of their 299 students to identify correlations. The teachers of higher achieving students asked more text-based questions, provided more positive feedback, probed more, and used more probe types than other teachers.

Mills, S.R.; Rice, C.T.; Berliner, D.C.; and Rosseau, E.W. "The Correspondence between Teacher Questions and Student Answers in Classroom Discourse." Journal of Experimental Education 48(1980): 194–204.

Investigates the relationship between the cognitive level of teachers' questions and the cognitive levels of students' responses. Fifty-four classes of students in grades four through eight and their teachers participated. Chances were found to be about even (53 percent) that student responses would correspond in cognitive level with teacher questions.

Pearson, P.D. "Changing the Face of Reading Comprehension Instruction." The Reading Teacher 38(1985): 724–738.

Discusses current research and trends regarding the teaching of reading comprehension. Presents research findings and guidelines concerning teachers' questioning strategies.

Redfield, D.L., and Rousseau, E.W. "A Metaanalysis of Experimental Research on Teacher Questioning Behavior." Review of Educational Research 51(1981): 237–245.

Reviews 20 research studies on the achievement differences produced by higher and lower cognitive questions. Concludes that asking higher cognitive questions has a significant and positive effect on student performance.

Riley, J.P., II. "The Effects of Teachers' Wait-Time and Knowledge Comprehension Questioning on Science Achievement." Journal of Research in Science Teaching 23(1986): 335–342.

Investigates relationships among cognitive level of teacher questions, wait-time, and student achievement of knowledge and comprehension level objectives. The most desirable wait-time and questioning strategy differed depending upon objectives.

Rowe, M.B. "Science, Silence, and Sanctions." Science and Children 6(1969):11–13.

Summarizes research on the effects of teachers' questioning behaviors and encourages teachers to make use of these findings in their classrooms.

Samson, G.E.; Strykowski, B.; Weinstein, T.; and Walberg, H.J. "The Effects of Teacher Questioning Levels on Student Achievement." Journal of Educational Research 80(1987): 290–295.

Summarizes a meta-analysis of 14 studies of the relative achievement effects of asking higher and lower cognitive questions in classroom discussions. Found that students exposed to higher cognitive questions outperformed other students, but that the effect size is small.

Shuck, R.F. "An Empirical Analysis of the Power of Set Induction and Systematic Questioning as Instructional Strategies." Journal of Teacher Education 36(1985): 38–43.

Compares the achievement of 120 ninth graders whose teachers received various kinds of training or no training. Different groups of teachers were trained in (1) set induction, (2) systematic questioning, (3) both and (4) neither. Trained teachers' students outperformed those of control teachers, and students of set induction-trained teachers outperformed those of questioning strategy-trained teachers.

Sitko, M.C., and Slemon, A.L. "Developing Teachers' Questioning Skills: The Efficacy of Delayed Feedback." Canadian Journal of Education 7(1982): 109–121.

Describes a study in which twenty teachers were taught a questioning technique to enable them to ask more higher cognitive questions and to vary the level of questions posed during discussions. Results indicated that training enables them to ask more higher level questions, that there was a close correlation between the level of questions and student responses, and that the incidence of higher level student responses increased.

Smith, L.R. "The Effect of Lesson Structure and Cognitive Level of Questions on Student Achievement." Journal of Experimental Education 54(1985): 44–49.

Examines the effects of highly structured and more loosely structured lessons and of higher and lower cognitive test questions on students' test performance. High-ability students performed better with highly structured lessons. All students performed better with lower level questions.

Soled, S.W. Teaching Processes To Improve Both Higher As Well As Lower Mental Process Achievement. Paper presented at the Annual Meeting of the American Educational Research Association, Washington, D.C., April 20–24,1987. (ED 287 823).

Reports the results of two studies, one involving 100 seventh graders and the other involving 85 ninth graders, in mathematics and science. The use of higher cognitive questions in the classroom, in the instructional materials, and in tests resulted in greater gains in both higher and lower mental process achievement on the part of experimental students.

Swift, J.N., and Gooding, C.R. "Interaction of Wait-Time Feedback and Questioning Instruction on Middle School Science Teaching." Journal of Research in Science Teaching 20(1983): 721–730.

Studies the effects of increased wait-time and questioning skills (separately and together) on the quality of classroom discussions in 40 middle school science classes. Instruction in questioning skills made little difference, but increased wait-time resulted in greater student engagement during classroom discussions.

Tobin, KG., and Capie, W. The Effects of Teacher Wait-Time and Questioning Quality on Middle School Science Achievement. Paper presented at the Annual Meeting of the American Psychological Association, Montreal, September 1980.

Reports the results of a study of questioning and wait-time involving middle school students in thirteen classes. Teachers' posing higher order questions and waiting three to five seconds for student responses were both significantly related to student achievement and retention.

Tobin, K, and Capie, W. Wait-Time and Learning in Science. Burlington, NC: Carolina Biological Supply Co. 1981. (ED 221 353).

Discusses different conceptualizations of wait-time, synthesizes the literature on wait-time, and assesses the efficacy of training teachers in wait-time strategies. Implications of findings for pupils in science classes are discussed.

Wilen, W.W. Questioning Skills for Teachers. What Research Says to the Teacher. Washington, D.C.: National Education Association, 1982. (ED 222 488).

Reviews research findings concerning the verbal questioning practices of teachers and offers research-based suggestions for teachers' use.

Wilen, W.W., and Searles, J.E. "Teachers' Questioning Behavior: Students' Preferences and the Relationship of Preferences to Achievement." Education 98(1977): 237–245.

Presents the results of a study of the relationship between students' preferences regarding the cognitive level of questions put to them and their performance when tested with questions of that type. Forty-three eleventh graders in social studies classes participated. Virtually no students preferred higher level questions and those preferring lower level questions performed better with this kind of question than with other kinds.

Winne, P.H. "Experiments Relating Teachers' Use of Higher Cognitive Questions to Student Achievement." Review of Educational Research 39(1979): 13-50.

Reviews 13 studies of the relative effects of higher and lower cognitive questions on student achievement. Concludes that there are no significant achievement differences between the two approaches.

Wixson, K.K. "Questions About a Test: What you Ask About Is What Children Learn." Reading Teacher 37(1983): 287-93.

Reviews two studies of the relationship between the kinds of questions students are asked and the information they are later able to recall about passages they have read. Fifth graders in both studies had the best recall regarding story content about which they had previously been queried.

Other References

Anthony, H.M., and Raphael, T.E. "Using Questioning Strategies to Promote Students' Active Comprehension of Content Area Material." Occasional Paper No. 109. East Lansing, MI: Michigan State University, 1987. (ED 280 011).

Discusses the kinds of conceptual knowledge involved in comprehension, reviews questioning strategies that can help foster comprehension, and identifies instructional methods that can help students learn to use questioning techniques.

Christenburg, L., and Kelly, P.P. Questioning: A Path to Critical Thinking. Urbana, IL: ERIC Clearinghouse on Reading and Communication; National Council of Teachers of English, 1983. (ED 226 372).

Presents theory and guidelines regarding questioning techniques to help upper elementary and secondary teachers increase their students' critical thinking.

Ciardiello, A.V. "Teacher Questioning and Student Interaction: An Observation of Three Social Studies Classes." The Social Studies (1986):119-122.

Discusses the questioning behaviors of three observed teachers in relation to research findings regarding teacher questioning and his personal experiences as a social studies teacher.

Cotton, K. Instructional Reinforcement. Portland, OR: Northwest Regional Educational Laboratory, 1988.

Synthesizes the research on reinforcing students' learning in classroom settings and offers research-based guidelines for providing reinforcement.

Cotton, K Monitoring Student Learning in the Classroom. Portland, OR: Northwest Regional Educational Laboratory, 1988.

Summarizes research on the effects of various classroom monitoring practices and provides guidelines for effective classroom monitoring.

Dillon, J.T. Teaching and the Art of Questioning. Bloomington, IN: Phi Delta Kappa Educational Foundation, 1983.

Discusses the role of questioning in educational settings and points to the drawbacks of the questioning style used in typical classroom recitations. Cites the advantages of true discussion-as opposed to recitation-and offers alternatives to questioning in classroom discussions.

Gall, M.D. "The Importance of Context Variables in Research on Teaching Skills." Journal of Teacher Education 28(1977): 43–48.

Uses data from two experiments involving questioning techniques to illustrate the importance of context variables in classroom research studies.

Harvard Graduate School of Education. "Teachers' Questions: Why Do You Ask?" Education Letter 3(1987): 1–3.

Discusses research on questioning and offers research-based guidelines for teachers' classroom questioning methods.

Hargreaves, D.H. "Teachers' Questions: Open, Closed, and Half-open." Educational Research 26(1984): 46-51.

Discusses the relationship between teachers' questioning techniques and student behavior, including the ways that these influence one another.

Martin, R.J. "InSPIRE." Reading Psychology 8(1987): 127-129.

Describes the methodology and preliminary results of a study of the Intervention for Student Performance in Reading Education (InSPIRE) program. Teachers participate in staff development to improve their questioning/reinforcement skills, and are subsequently observed and given feedback on

their performance.

Meyer, L.A. Teachers' Comprehension Questions: What Functions Might They Serve? Champaign, IL: Illinois University, Center for the Study of Reading, 1984. (ED 247 520).

Reports the results of an observational study of the questioning behaviors of first, second, and third grade teachers in a rural southwestern school. Teachers asked more factual questions of younger and lower performing students and more inferential questions of older and higher performing students.

Ornstein, A.C. "Questioning: The Essence of Good Teaching—Part II." NAASP Bulletin 72(1988): 72–80.

Reviews research on questioning techniques and offers research-based "tips" and "pitfalls" to help teachers ask more productive classroom questions.

Partin, R.L. "How Effective Are Your Questions?" The Clearing House 52(1979): 254–256.

Discusses the reasons teachers ask questions as part of instruction and offers guidelines for questioning strategies. Includes advice about types of questions to avoid.

Stiggins, R.J., and Liston, S. Guidelines on the Use of Instructional Questions as Classroom Assessment. Portland, OR: Northwest Regional Educational Laboratory, 1988 (draft).

Discusses classroom questioning strategies in relation to what is known about conducting sound assessments. Summarizes research on questioning and looks at the role of questioning in both teacher and student decision making.

Wise, B., and Sharer, J.C. Effectiveness Training for Elementary Teachers of Reading. Paper presented at the Annual Meeting of American Reading Forum, Saratosa, FL, December 8–10,1983. (ED 240 530).

Investigates the effects of five kinds of instructional process variables on the reading achievement of children in grades two through five. Significant differences between more and less effective teachers were noted in the areas of engaging students in learning and asking direct questions.

This publication is based on work sponsored wholly, or in part, by the Office of Educational Research and Improvement (OERI), U.S. Department of Education, under Contract Number 400-86-0006. The content of this publication does not necessarily reflect the views of OERI, the Department, or any other agency of the U.S. Government.

May 1988

Kathleen Cotton. "Classroom Questioning." North West Regional Educational Laboratory. Used with permission.