Questions, questions, questions! They are a large part of a teacher’s stock-in-trade. We use questions to help students review, to check on comprehension, to stimulate critical thinking, to encourage creativity, to emphasize a point, to control classroom activities and cut down on disruptive behavior, to help determine grades, to encourage discussion, to discourage inattentiveness, and for other reasons and purposes. Questioning style and content varies from teacher to teacher, student group to student group, and situation to situation.

The aim of this “How to . . .” booklet is to help you focus on a common teaching activity—the asking of questions. To illustrate some of the classifications and concepts discussed, excerpts from a videotaped lesson to third graders on magnetism appears at the end of this booklet.

As teachers we sometimes get so involved in asking questions that we don’t give much time to analyzing why and how we do it; questioning seems such a natural technique. But if we analyzed the questions we ask during a class period, we might be surprised by the results. We would probably discover that most questions are designed to determine only whether a student does or does not know a particular item of information. But our questions need to do more.

The science curriculum improvement projects of the 1960s promoted hands-on activities in science and student inquiry, based on the rationale that students develop better understandings of the nature of science and are more interested in science if they are actively involved in doing science.

Learning by doing is still advocated in science teaching today. However, while the manipulation of equipment and materials is important in science classrooms, it is also necessary that students’ minds be engaged by the activity. Helping students develop their problem-solving skills needs to be planned for—it does not necessarily occur as a byproduct of doing science.

The science curricula of the 1990s also reflect the influence of additional points of view concerning what is important for students to learn. One of these is the emphasis on science, technology, and society (STS). STS proponents argue that the purpose of school science is not to create future scientists but citizens who understand that science is multidimensional and multidisciplinary, and who can participate intelligently in problem solving and decision making about how science and technology are used.
Another emphasis, constructivism, is derived from research in educational psychology about learning and is focused on conceptual change. Constructivists say that learners build or construct their own knowledge based on their observations and experiences. If learners’ self-constructed knowledge differs from the concepts presented in formal science instruction, then curriculum materials and instructional approaches must be used that bring about conceptual change (Roth, 1989).

All three emphases have implications for the kinds of questions teachers ask in science. If students are to discover, if students are to become better problem solvers, if students are to comprehend that their intuitive, everyday ways of explaining the world around them need to be adapted in order to better describe, predict, explain, and control natural phenomena—they need to develop higher-order thinking skills. Some teachers believe that students must learn facts first, and then be asked to think about them. This overlooks the importance of the many processes by which facts may be acquired. Thinking is a way of learning (Raths, Wasserman, Jonas, and Rothstein, 1986, p. 2–3). Therefore, the kinds of questions teachers ask influence the level of thinking operations students engage in. We still need, at times, to check for the correct recall of basic items of information, but this should be only one of the reasons for asking questions, not the primary reason.

The remainder of this booklet is devoted to providing some methods which you can use to analyze your questioning strategies and to suggest some techniques for developing variety in the kinds of questions you ask.

**Types of Questions**

To develop variety in questioning, you need to know what kind of questions you commonly ask. Research on the questions teachers ask shows that about 60 percent require only recall of facts, 20 percent require students to think, and 20 percent are procedural (Gall, Dunning, and Weathersby, 1971). By analyzing your questioning behavior you may be able to decrease the percentage of recall questions and increase the percentage that require students to think.

There are numerous systems for classifying questions—some are listed at the end of this booklet (see page 13). Many of these systems are based on the seven categories listed in Bloom’s *Taxonomy of Educational Objectives, Handbook I Cognitive Domain* (1956). Norris Sanders, who developed a classification system for use with social studies materials, used Bloom’s taxonomy to place questions in one of seven categories: (1) memory—recall; (2) translation—changing information into different symbolic form or language; (3) interpretation—seeing relationships; (4) application—solving a lifelike problem by drawing on generalizations and skills; (5) analysis—solving a problem from conscious knowledge of the parts and forms of thinking; (6) synthesis—solving a problem requiring original creative thinking; and (7) evaluation—making judgments according to standards (Sanders, 1966).

There are other classification systems based on Bloom’s taxonomy. For example, Clegg, Farley, and Curran (1967) (also working in social studies) developed six categories of questions: memory, comprehension, application, analysis, synthesis, and evaluation.

In even less complex systems, questions are classified as relating to either knowledge or higher—referring to one or more of the other six categories in Bloom’s Taxonomy—but this may be an oversimplification. It only helps you if you are emphasizing factual recall in your questions.

The Question Category System for Science (QCSS) (Blosser, 1973) consists of three levels of classification, two of which are described in this booklet. Questions are first classified as being one of four major types: Managerial, Rhetorical, Closed, or Open (see Fig. 1).