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Studying the Cognitive Emphases of Teachers' Classroom Questions[1]

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TEACHERS' classroom questions only recently have received renewed attention in the general study of teaching. They have not been ignored, certainly, but they have been obscured. To be sure, questions and questioning have remained prominent in various pedagogic contexts, from Socratic-like programmed instruction to now-popular discovery modes. Nevertheless, questions asked by teachers have been given little specific notice. More precisely, the cognitive emphases of teachers' questions, relating as they do to operational cognitive objectives, now merit systematic attention.

Earlier in this century, teachers' questions were subjects of concern for both instructional methods and for empirical investigation. The conventional pedagogic wisdom of the times recognized the value of well-planned and effective questioning. The recitation, for example, would be frustrated by inept and misguided teacher questioning practices. Stevens (1912) provided evidence that teachers (of English and social studies) not only did most of the talking, their talk was constituted largely of questions. Teachers' questions, additionally, emphasized memory more than any other activity and smothered pupils' expressions as well.

While this pioneering work has been cited often, Stevens' plea for efforts to use questions as stimuli for reflective thought seems to have had two types of impact. This early research has been used to support the assertion that teachers should talk, and question, less. Also, it probably has served to document the "established fact" about teacher questioning and may well have inhibited subsequent investigations. Findings of more recent studies (Floyd, 1960; Adams, 1964) have confirmed Stevens' general conclusions. The evidence reasonably indicates that teachers of today, not unlike those of 50 years ago, ask mostly questions requiring recall and ask few questions prompting "thought."

Emphasis on fact-questions in the classroom certainly is not restricted to questions verbalized by teachers. The objective of most questions in textbooks, classroom tests, and other instructional materials is also memory (Davis and Hunkins, 1966; Pfeiffer and Davis, 1965; Windley, 1966). Set against this type of evidence, the frustration of half a century's rhetoric about problem solving

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and critical thinking is obvious and, perhaps, monstrous.

Teachers' Questions

Three separate developments apparently have sparked the renewed interest in teachers' questions. One undoubtedly was the mid-century attention directed toward intellectual achievements. New curriculum proposals decreed concern with structure and modes of inquiry and discovery. Interestingly in review, the role of teachers' questioning in these plans was seldom analyzed and related to different cognitive demands on pupils. Still largely unavailable are studies of specific teacher behaviors, including questioning acts, connected with the classroom implementation of many proposals.

A second development was the resurgence of interest in the direct study of teaching. Allied to investigations of teaching effectiveness mainly by history, the new analyses undertook to describe rather than evaluate what teachers did in the classroom. The first significant studies focused on the social and emotional climate and did not attend to the intellectual climate of the classroom. Even so, the questions teachers asked were recognized as an important component of classroom language.

Almost all observation systems developed to record teachers' verbal behaviors include one or more categories of teachers' questions. For example, Flanders' Interaction Analysis (IA) (1965) includes the category "Asks Questions" which is defined as contributing to teacher indirectness. While IA obscures properly different functions of teachers' questions by treating all questions identically, this system is not faulted. It was constructed for purposes other than assessing the cognitive influence of teaching. The system has been modified (Amidon, 1966) to incorporate attention to different cognitive emphases of teachers' questions.

Very important to the current scene has been the substantial progress, both theoretical and practical, in the analysis of cognitive operations. Until the mid-1950's metaphors like "problem solving," "critical thinking," and "higher mental processes" were the most able attempts to describe thinking processes beyond memory. Admonitions to ask more "why" questions rather than "what" questions were frequent.

Since the work of Guilford (1956) and Bloom (1956), cognitive processes, too long misunderstood as "thought," have been identified in hierarchical complexity. Particularly important in light of some pedagogic traditions of this century is their assertion that "knowledge" and "memory" are essential and prerequisite to thinking. Consequently, these relatively new formulations provide types of criteria for the analysis of thinking operations observable in classrooms. Too, they offer more substantial bases than formerly available for suggestions for improved pedagogic practices.

Although most studies of teaching have investigated social and emotional dimensions, an increasing number have focused on cognitive components. A few are illustrative of the present trend. Smith, who counseled early about the neglect of intellectual operations of teaching (1962), has completed studies (for example, Smith and Meux, 1962) and sponsored other investigations of the logic of teaching. Gallagher and Aschner (1963) based their analytic system on Guilford's constructs. Gallagher's subsequent work (1967), while still evidencing some of his early formulations, incorporates some new and very usable categories for classifying thinking skills.

The examination of classroom discourse as a special type of "language game" marks the study of Bellack and his associates (1966) as an innovative contribution. That teaching strategy and thought processes productively can be analyzed was demonstrated dramatically by Taba and her associates (1964). Each of these studies and their accompanying observational systems analyzed teachers' questions. Neither, on the other hand, directed its attention specifically toward these questions.

Sanders' *Classroom Questions: What Kinds?* (1966) has become quite influential. It has taken the necessary step from the Bloom *Taxonomy* categories to suggested

questions to foster the several types of higher order operations. The volume, while emphasizing illustrations from social studies and English, has attracted deserved attention in both preservice and in-service preparation programs. Evidence that it is useful as one means of helping teachers to understand questioning and to change the cognitive emphases of their own questions is becoming available.

Cognitive Emphases

Apparently, only a few studies of teaching have concentrated on the cognitive emphases of teachers' questions. Of these, three undertaken by members of this writing group serve to illustrate some of the opportunities for study open in this largely unexplored field as well as some of the admittedly primitive observational records employed and under development.

In the first two studies (Davis and Tinsley, 1967; Rogers, 1969), questions of elementary and secondary student teachers were analyzed, utilizing a standard observation record. Both found that student teachers employed mainly memory questions in their discourse and that some higher level processes (including application, analysis, and synthesis) were not stimulated by teacher questions. Confirming a study by Clegg and others (1967), Rogers also concluded that a special preparation component on varying cognitive emphases of questions does influence teacher candidates to alter significantly their questioning practices.

The observation instruments used in these studies were similar. Both included seven cognitive categories corresponding to Bloom's taxonomic ordering: *memory* (from Bloom's "knowledge"), *translation* and *interpretation* (from Bloom's "comprehension"), *application, analysis, synthesis,* and *evaluation*. The first schedule included two noncognitive categories, *affectivity* and *procedural*. The second added to these *textbook* (questions read by teachers from the text or other material) and *pupil-initiated* (questions asked by pupils which were repeated by the teacher for another pupil or the class to answer).

Questions were those utterances of the teacher which had both an interrogative format and required a pupil response. Rhetorical questions, under this rule, were not classified. Questions were judged by attention to their inferred intent and the nature of the pupil response elicited and its reception. That is, a question could call on a pupil to state (or know) a criterion and use it to judge a situation (evaluation); if the pupil responded with a "pat" conclusion and if this response were accepted by the teacher, the question would be classified as "memory." This rule seems complicated; it does require attention to several criteria almost simultaneously. Nevertheless, it has not been difficult to learn and apply.

The formats of the two schedules were considerably different. The first required only that the observer tally each question in the appropriate category. The sequence of the questions, as a result, was lost. Change of the format makes possible both total frequency for each category and total sequence of questions.

Training of observers in both studies to use the observation schedule was accomplished in approximately 12 hours. During the training sessions, observers learned the category system and coded teachers' questions using audio and video tape recordings. Midway during the observation period, observers met for another training session. A mean inter-rater agreement of .85 (over categories) was reached by the end of training with inter-rater agreements (by categories) ranging from .60 to 1.00.

These studies pointed the direction toward research presently under way and planned. Of considerable importance has been the development of a much expanded and a more comprehensive observation and recording system for teachers' questions.

The *Questioning Strategies Observation System* (Morse, 1968) makes possible a record not only of the cognitive levels of teachers' questions but of other behaviors related to successful questioning strategies. Included in the system are categories for recording the

manner by which teachers direct questions to pupils in the class, the types of response elicited from students, and the ways the teacher reacts to pupil responses. This system, containing 24 separate categories, includes the six levels of Bloom's *Taxonomy* as the core of the analysis of questioning strategies. The format of the system is similar to that of the OScAR 5V (1967; Medley and others, 1968; Smoot, 1968), in that it is based on the "thought unit" and is coded in a similar fashion. The categories of the system which are designed to code strategies of teacher elicitation, response, and reaction are related directly to the work of Harris and McIntyre (1964). The system has been designed so that it may be used both with live observation and with tape recordings of teachers' classroom verbal behavior.

Present efforts to study the cognitive emphases of teachers' classroom questions are best understood as first steps. Subsequent activity should yield constructs and instruments of increased sophistication and, hopefully, increased simplicity. Categories of cognitive processes employed have been taken from Bloom and Guilford, in the main. Reliance on these categories, while appropriate and productive at present, should not inhibit consideration of alternate conceptions.

Other taxonomies surely will be developed. For example, perhaps "problem solving" will be translated from metaphor into a meaningful hierarchy of discrete operations. Such an event would signal increased opportunities to investigate teaching practice in line with long established theoretical formulations. Also, other presently available taxonomies and systems, like one to analyze teachers' questions and questioning strategies in reading instruction (Guzak, 1967), should be reconsidered and used more for special purposes. In addition, future empirical study should be productive of evidence directly useful in the improvement of the cognitive climate of classrooms.

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