

● Research in Review

Column Editor: James Rath

Teachers' Demands and Students' Thinking¹

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IT IS scarcely newsworthy today to note that the research community has been and continues to be preoccupied with the identification and investigation of thinking abilities. The writings of Guilford (1956) and of Bloom's committee (1956) have broadly popularized concepts such as "divergent thinking," "convergent production," "synthesis," and "evaluative" abilities.

No doubt long overdue, increasing attention has been paid to the broad range of cognitive abilities that are now believed to define human intelligence, in contrast with earlier and more restricted conceptions of intellectual capacity and functioning. Most notable among the consequences has been the prodigious volume of research and commentary upon creative thinking. Special

interest, of course, has been addressed to the question of the relationship between environmental conditions and the development of creative and other intellectual factors of children and adolescents.

Caught up in some of these same pervading currents of thought, educational psychologists and other researchers with interests in the workings of classrooms have shown rekindled interest in the encounter of teaching as the arena in which students' thinking abilities grow and develop through daily jousts with the teacher. Despite different orientations about the nature of thinking, and differential success in sketching out dependable relationships between events in the classroom and the impact of these events upon students, these inquiries have had in common an effort to illuminate the mysterious and poorly understood issue of the development of students' thinking abilities in relationship to their experiences in school.

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Smith (1959), for example, has construed teaching episodes in terms of their characteristics of logical thinking, such as defining, explaining, and inferring. Other classroom researchers apparently owe Smith an enormous debt for his clear demonstration of the possibility of systematic and meaningful examination of classroom language in pursuit of the study of thinking. Also worthy of mention in this connection is the work of Bellack *et al.* (1966), who have crystallized many of the regularities of classroom interaction, and made manifest some of the limitations within which substantive meanings must be communicated.

With focuses closer to the research to be described here are the writings of Taba (1966) and Gallagher and Aschner (1963), each of whom has painstakingly sketched links between specific classes of teacher behavior and the consequent responses of pupils. Taba has developed the concept of the *teaching module*, a sequence of teacher and student interactions that is characterized by one or more high level thinking responses of a pupil. Four kinds of modules have been identified. Presumably if it is possible to isolate and experimentally vary the characteristics of teacher behavior that signal the occasion for high level pupil thinking, it should also be possible to develop and communicate to teachers some general guidelines for tactics and strategies of teaching that would tend to foster and facilitate higher levels of pupil thinking in the classroom.

Similarly, Gallagher and Aschner (1963) have suggested the enabling role of teacher behavior in increasing the frequency of student behavior of a par-

ticular type, in this case divergent thinking. Their data support the general contention that a minimal amount of divergent seeking behavior by the teacher is sufficient to produce a variety of divergent responses from students. The authors of this summary feel that continued, systematic efforts, of the kinds instigated by the researchers cited above, for instance, are badly needed if a serious and concerted effort to understand and subsequently control student thinking in the classroom is to be mounted.

In the present investigation, nine junior high school English classes were each observed for a period of one week. All the lessons taught during that time were tape recorded, and the forty-five typescripts subsequently produced constitute the basic data of the analyses to be reported. The nine classes used for observation were all located in a single suburban junior high school. Each of the nine teachers had agreed in advance to permit observers in his class for the designated times and purposes. Three classes of the research sample were seventh grades, three eighth grades, and three ninth. In addition, students in this school are assigned to English classes at one of three levels, based upon ability and achievement. Consequently, in each grade, the classes represent varying administrative arrangements, with whatever implications these obtain for differences in educational goals, curriculum materials, motivations of students and teachers, etc.

The typescripts of the forty-five lessons were coded to reflect the kind of thinking engaged in by the teachers and by the students. Each comment uttered received an identifying tag. Among

other things, this procedure permits some analysis of the sequential flow of thinking in each individual's verbal behavior, and an opportunity to examine the contingent relationships between teacher thinking and pupil thinking.

The system used for coding the behavior of our subjects is a slight modification of that earlier developed by Aschner, Gallagher *et al.* (1965), which in turn borrows from the product categories of Guilford's Structure of the Intellect. Special demands of the classroom require some categories in addition to those for intellectual operations if all of the interactions that occur are to be taken into account. In the present case, the coding system included the following basic classifications: *management*, to account for those classroom behaviors dealing with routines, procedures, and discipline; and *substantive*, the verbal activities of the classroom that operate with the subject matter of the lesson. The substantive classification was subdivided into categories for old factual information (reviews of previously presented material), new information, convergent thinking (which demands either translation, explanation, or conclusion drawing), divergent thinking (requesting or supplying multiple or unspecified responses or solutions), and evaluative thinking (either judgments using one's own values or judgments using commonly expressed values).

Several analyses have been made of the overt thinking data. The first concerns the frequency with which each of the several kinds of behavior occurs, and the percentage of the total behaviors each represents. Several features of this analysis are noteworthy.

Two immediately striking facts concern the amounts of teacher and student behavior devoted to more demanding intellectual operations, such as seeking new relationships or making judgments, compared with factual operations. In the first case, teachers and students in our sample each devote slightly more than three percent of their classroom utterances to higher order thinking but many times more of their verbal behavior occurs at the level of factual discourse, the teachers as a group thus spending about 55 percent of their remarks, students about 80 percent.

An additional analysis had revealed that, on the average in this sample of classes, nine out of every ten comments made by the students were addressed to the subject matter of the lesson. It now becomes obvious that about eight of every ten contributions of students deal with *facts* about the content. Thus, less than one of ten interactions occurs at a level of intellectual functioning more demanding than factual statement. Naturally the classes are variable in this regard. In one class no student statements were classifiable at a level higher than fact stating. In two others the percentages rose as high as eleven and sixteen.

It is possible to obtain some indication of the pace with which content flows in and out of the classroom discussions by comparing the relative attention devoted to old and new facts. As a group, teachers spend 29.8 percent of their moves introducing new facts, and 25.8 percent dealing with old facts. The order of attention is reversed for students, as is the magnitude of the percentages: 41.4 percent on old, 39.2 percent on new.

Although students devote more of their overt behavior to facts than teachers do, teachers engage in much more management behavior than do students. More than half the management moves of teachers are reactions to student moves, typically confirming or disconfirming the adequacy of a student response. For teachers and for pupils, the sum of the three categories, old facts, new facts, and task relevant management categories, yield highly similar values.

One final analysis deserves comment. Although it is impossible to demonstrate with the present data that student behavior is contingent upon teacher behavior, this analysis tends to lend support to such an hypothesis. We have found that a significant rank order relationship exists between the percentage of higher order comments made by teachers and those made by students. To illustrate, the teacher who extends the greatest number of invitations to his students to think divergently is most likely to generate the greatest number of such behaviors on the part of his students. The illustration could be extended to convergent and evaluative thinking as well.

This relationship is an important one, but the fact that its existence is demonstrable in the present case is regarded simply as the confirmation of an expectation. It strengthens the conviction that the verbal behavior of teachers can be used to condition the verbal behavior of students.

At least it now seems reasonable to believe that tactics and strategies of teaching can be developed that will result in students behaving more frequently in classes in ways that have

here been identified as convergent, evaluative, and divergent thinking. Yet the fact of an expressed relationship does not mean that such strategies are destined to lead to improved problem solving, creative, or critical thinking of students. In order to bring about those ends, careful theoretical and empirical investigations of the thinking processes will have to be intertwined with imaginative ventures at social engineering.

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