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Teaching for Intelligent Behavior

Specific teacher behaviors influence how effectively students acquire information, make information meaningful, and apply meanings to new situations.

What classroom conditions contribute to the development of intelligent behavior? I offer the following criteria, some of which are based on soft assumptions, while others rest on hard data. All reflect a strong belief that teaching for intelligence is a primary goal of education.

1. *Do students realize intelligent behavior is an objective?*

Teacher: "Why do you think Carl Sandburg repeated the last line of this verse?"
Student: (no response)
Teacher: (long pause) "Well, what feelings did *you* have as you read the poem?"
Student: "Why don't you just tell us the answer?" (Wasserman, 1978, pp. 100-101).

Students expend great energy trying to figure out the teacher's intentions. Because some students come from homes, previous teachers, or other schools where intelligent behaviors are not valued, they often are dismayed by and resistant to a teacher's invitation to think. Such resistance and reluctance should indicate that a program to develop intellectual skills is needed.

Teacher directions, focusing, and instructions, therefore, must ensure that students realize thinking processes and strategies are the goals of instruction; that the responsibility for thinking is the students'; that it is desirable to have more than one solution; that it is commendable when they take time to plan and to think; that it is okay to change an answer with the addition of more information.

Regardless of how explicit teachers make the objectives of thinking, however, their implicit behavior will communicate this goal even more effectively.

2. *Does the teacher's language invite intelligent behavior?* Information taken in is constantly being interpreted in terms of what is already known. If new information can be easily understood with familiar knowledge, no problem or challenge exists. If, however, the new information cannot be explained or resolved with the knowledge in short- or long-term memory, a discrepancy is perceived. The information must be processed, action must be taken to gather more information to resolve the discrepancy, and the ultimate resolution tested for its "fit" with reality. Thus, a problem may be defined as a stimulus or challenge to which a response is not readily apparent.

To stimulate development and use of cognitive skills, the teacher calls attention to discrepancies and poses problems intended to invite more than a memory-type response, then asks questions or makes statements designed to produce data, relationships, and generalizations that can be employed to resolve the problem (Davis and Tinsley, 1967; Andre, 1979; Lowery and Marshall, 1980). Teachers' questions can cause a lifting from one level of cognition to a higher level (Taba and others, 1964).

With this model of intellectual functioning in mind, the teacher can

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use questions and statements to invite the student to gather information, compare that information with what is in memory, draw meaningful relationships, and apply or transfer those relationships to hypothetical situations.

3. *Are instructional activities arranged sequentially?*

A child learns first to recognize a rectangle by abstracting the features of many particular rectangles and then applying this knowledge to future situations (Restak, 1979, p. 299).

Bloom, Taba, Bruner, Piaget, and others have helped us see that levels of thinking are cumulative. It can be counterproductive for a teacher to invite student processing or output thinking tasks without providing adequate time and experience for data accumulation.

If the student has had inadequate input from memory, experience, or sensory stimulation, there will be inadequate data with which to perceive discrepancies and, therefore, to function at the processing level. If those data are not processed and integrated by comparing, exploring causal relationships, and so on, the higher levels of thinking will be inadequate.

Teachers who understand the need for an instructional sequence can observe and analyze student thinking as they teach. If a question, statement, or problem focus produces cognition at the level intended, there is a match. If, however, the level of elicited student thinking is inconsistent with what the teacher intended, or if no discrepancy in the problem is perceived, there is a mismatch. Noting this, the teacher can adjust the level and complexity of the cognitive task to one more appropriate to the student's current level of intellectual functioning and remain at that level until enough data have been gathered or processed.

4. *Do teachers' responsive behaviors enhance and extend students' intelligent behavior?* Much of students' cueing comes *not* from questions or statements but from the teacher's response behaviors. If a teacher reacts to a student's answer with a response that signals conformity—praise (Brophy, 1979), corrective feedback, criticism, or other value judgments (Rowe, 1974)—students will soon realize that their individual thinking is not valued as much as correctly guessing what the teacher had in mind.

Numerous responsive behaviors seem to facilitate intellectual functioning: silence after a question or after a student responds (Rowe, 1974); accepting, building upon, integrating, and extending students' ideas (Flanders, 1969); clarifying (Klevin, 1958); and providing additional information (Andre, 1979; Suchman, 1966). Such behaviors seem to create a stress-free, cooperative classroom condition where experimental ideas can be risked, alternative hypotheses explored, and answers changed with additional data; where value is placed on creative problem-solving strategies rather than on conformity to "right" answers.

5. *Do the materials of instruction support intelligent behavior?* Because the "medium is the message," our materials of instruction communicate educational values. If materials are designed to be read, memorized, and tested, then students will think this is the purpose of schooling. If, however, materials are organized and articulated through the grades and across content areas with common and recurring intellectual goals, they can, over time, help convince the learner that thinking is valued.

The development and adoption of instructional materials, therefore, must be based on their contribution to and development of intellectual skills. The range of available instructional materials includes (1) those that claim that intelligent behaviors will result from their use; (2) those that use a content vehicle such as math, science, or social studies to experience and apply the behaviors;[1] and (3) those that are expressly designed to focus on and deliberately develop one or more of the cognitive skills.[2]

6. *Is adequate instructional time devoted to developing thinking?* Much research has demonstrated that achievement in basic skills as measured by standardized tests correlates highly with the amount of time students are successfully engaged in learning (Borg, 1980). This same proposition undoubtedly holds true for teaching intelligent behaviors. The way we use our time reflects our value system. If the development of intelligent behaviors is valued in our schools, high priority and substantial time must be allocated to it.

7. *Does instruction provide for differences in modality strengths?* Anderson and Faust (1973) contend that a question will not have an instructional effect unless students actually make a response, which may be overt or covert. Teachers' questions are usually posed orally and responded to verbally by only one student at a time, so they may appeal and be responded to mainly by verbal learners. However, some students respond better in a visual or tactile mode (Barbe and Swassing, 1979; Dunn and Dunn, 1978). Teachers can increase opportunities for students to exercise their intellectual capacities by providing a visually, auditorily, and experientially stimulating environment.

8. *Are modalities sequenced according to developmental theory?* Psychobiologists have found strong support for Piagetian theories of cognitive development (Restak, 1979). New information is processed on the right side of the brain and begins with action and perception. As the information becomes familiar, it is then processed on the left side of the brain and proceeds to words and concepts (Restak, 1979). Too often educational practice ignores or reverses this sequence of learning. Probably the true cause of failure (according to Piaget) in formal education is that we begin with language rather than with real and material action.

Whenever possible, teachers should provide direct, concrete experiences first, after which they should mediate the experience by inviting students to think about and talk about what they have seen and done (Wirtz. 1980).

9. *Do students and teachers discuss their thinking?* When children enter the concrete operations stage, they develop a conscious awareness of self interacting with a real, objectively verifiable world. When they enter the formal-logical stage, another uniquely human capacity emerges: the ability to stand away from, reflect on, and evaluate one's own behavior (Whimbey and Whimbey, 1976).

Much evidence suggests that having students talk about their thinking processes and strategies of problem solving enhances their ability to think. Evidently, thinking and talking about thinking begets thinking (Strasser and others, 1972; Link, 1980; Whimbey, 1980; Bloom and Broder, 1950).

10. *Do evaluation practices assess intelligent behavior?* Most learning is evaluated with paper-and-pencil tests of what has been stored in memory. While it is easy to construct good test items to measure lower-level cognitive skills, it is much more difficult to design items that measure higher-order mental processes (Metfessel and Michael, 1973). Because of this difficulty and because of the format (mostly multiple choice) of standardized achievement tests, intelligent behaviors are often not measured (Eisner, 1979).

Probably the main problem that has plagued educational assessment is that it has not separated the effect of instruction on the acquisition of objectives covered in a lesson from the concepts, meanings, and intellectual functions *not* covered in a lesson (Andre, 1979). Thus, the focus has been on learning *of* the objectives, not learning *from* the objectives.

If growth in intellectual behavior is to be evaluated, we must reconceptualize our approach to assessment: the testing situations, instruments, processes, products, and interpretations. Individual cognitive maps displaying deficiencies and peaks in intellectual abilities should replace test scores. Tests should be learning experiences starting with real and concrete problems and advancing to more abstract, complex tasks. Over time, we should look for evidence of students' increased spontaneous and autonomous use of intelligent behaviors. Thus, the product of assessment should be not what answers the student knows but how the student behaves when he or she doesn't know. We should search for indicators of a shift from the attitude that reasoning has little value—that an answer is either known or it is not; that the first idea that comes to mind is as good as any other—to the attitude that problems are challenging, and that reasoning is fun and thus worth doing voluntarily.

11. *Do significant adults model intelligent behavior?* With imitation being a most basic form of learning, teachers', parents', and administrators' modeling of desired intellectual behaviors is requisite to student performance (Bandura, 1962; Belcher, 1975). Thus, in day-to-day events and when problems arise in schools and classrooms, students must see adults employing the types of behaviors identified here.

O. J. Harvey (1966) described personalities in a sequence of categories (similar to Piaget's) ranging from what he called "concrete functioning behaviors" to "abstract functioning behaviors." The University of California's Education Research and Applications Program found that abstract functioning teachers seemed more effective than concrete functioning teachers (Lowery, 1981).

Some classroom examples of abstract teacher behaviors consistent with successful intellectual functioning might be:

—Being sensitive to subtle clues in student behaviors

—Planning for instruction

—Considering alternative teaching strategies

—Using information and expertise as guidelines for beliefs and judgments rather than using power, rewards, and punishment

—Taking a student's point of view

—Using reason and patience in dealing with discipline problems.

Curriculum leaders are invited to consider these questions, relate them to their own experience, explore their meanings and consequences, and apply and evaluate them in their own situations. Perhaps the result will be more classrooms in which teaching contributes to development of intelligent behavior. ■

[1] Such materials include, for math, those published by Curriculum Development Associates, Inc.; for science, the Science Curriculum Improvement Study; and for social studies, Curriculum Development Associates' *Man: A Course of Study* and Holt's *Data Bank*.

[2] Such as those listed in Vye and Bransford, pp.26-28, this issue.

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Note: A longer version of this article, which includes a detailed list of input, processing, and output skills synthesized from many sources, is available from the author at California State University, 6000 J St., Sacramento, CA 95819.

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cortex. In the last 20 years, medical research with humans has produced new findings on hemispheric differences, memory, language production, and so on, much of it in connection with attempts to help patients with diseased or damaged brains. We asked four authorities—Robert Sylwester, Jeanne Chall, Merle Wittrock, and Leslie Hart—to comment briefly on implications for education.

We must not, of course, overstate what we know or can do. In a recent conversation Nickerson reminded me that each time we learn something more about the brain, "we also discover a little more about the depth of our ignorance of it." Most schools have trouble teaching some of their students the fundamentals of reading and writing, so it might seem presumptuous for them to take on thinking too. On the other hand it is probably sensible to put thinking skills first because thinking is basic to everything we teach. ■

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