"You Ask the Wrong Questions!"

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The teacher effectiveness research provides a foundation for teaching thinking because, properly understood, it stresses the search for meaning.

Barbara—the mother of Lisa, a 5th grader—recently asked her daughter about two concepts Lisa was studying for a test the next day:

"Lisa, can you tell me the difference between kinetic and potential energy?"

"No," Lisa replied.

"Okay, can you give me some examples of potential energy then?"

"Mother! You're asking me the wrong questions!" Lisa said in desperation.

"What do you mean?"

"What the teacher is going to ask on the test is 'Potential energy is _____' and 'Kinetic energy is _____.' That's *all!*"

This situation illustrates the importance of teaching for meaning. The current teacher effectiveness research is foundational both for learning what kinetic energy is and for the deeper, more complex understanding of how it relates to potential and other forms of energy and motion.

This research, which stems largely from elementary schools where we are teaching children how to read and do mathematical computations, presents us with structures and processes that are important at both ends of a continuum: at one end focusing on highly structured, sequential content, while at the other end examining complex human or physical problems from a wide variety of perspectives generating multiple meanings and interpretations. Teachers in both instances are engaged in a similar task: helping students find or create meaning out of experience.

Susan and Carolyn

Recently I observed 2nd graders reviewing fundamental math operations. In the same school I observed 5th graders engaging in complex reasoning in their analysis of a Wallace Stegner story, "The Colt." It is interesting to see just how the effective teaching research applies to both teachers as they challenge students to think about content at rather different levels, or at different points on the continuum, from seemingly simple and concrete to more complex and abstract.

Susan, the 2nd grade math teacher, was reviewing the composition of the number 17.

"How many tens, Mark?"

"How many ones, Jan?"

"Where do we put the 10, Gloria?"

"Where do we put the 7, Steven?"

"If we wish to prove this, what do we have to do. . . Billy?"

She proceeded in this fashion with direct questions to ensure that students recalled just how to analyze the number 17, how to prove their work if they were subtracting 17 from 38 or 9 from 18. She maintained that "brisk pace" we read about in the teacher effectiveness literature (Barnes, 1981) with many questions at a lower cognitive level. She made certain that she gave most students an opportunity to respond in order to ensure comprehension, and she provided many and diverse examples both at the board

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and on a worksheet in front of all students. She was thus engaged in what Rosenhine (1983) has called "overlearning . . . to the point where [facts and skills] are automatic."

What I witnessed was not the 20 minutes that Good (1982) recommends for the developmental phase of a mathematics lesson. This was a review. But many elements of direct or active teaching were present: tightly controlled teacher structure, a brisk pace with many questions, and a great diversity of examples to check comprehension. The result was active student engagement in the learning task with a high degree of success.

Carolyn's task was significantly different. She was reviewing "The Colt" with her 5th graders, who had read the story some time ago. Her challenge to them, after reviewing the plot and the major characters, was to analyze the characters using Kohlberg's (1975) levels of moral development. Students proceeded to take one character at a time—Pa, for example—and to analyze his behavior according to the levels of moral reasoning, adapted and slightly modified for this purpose.

"I think he was a three, because he had no really different ideas of his own."

"I disagree. I think he was a one, because he really didn't know right from wrong."

"Can you give us some examples of that, Beth?"

"Sure." And Beth proceeded to elaborate on her argument.

This interaction proceeded for about ten minutes with hands raised,

Active Teaching: "How many tens, Mark? How many ones, Jan?"

"Too often we forget to set the stage for learning by helping students recall what they have already learned."

reasons clearly and openly expressed, until someone said:

"Based on what Steven just said, I think he's a five because he really wanted to change things."

Carolyn finally asked her students why analyzing a story was different, if it was, from analyzing the fairy tales they had read and analyzed earlier.

"Because the characters are presented differently. . .they're more difficult to understand. . .fairy tale people are simple—not like humans."

Now, Carolyn's teaching task was more complex; her students were making judgments based not only on their recall of facts, but also from listening to the judgments of their peers. When I heard Tony say he had changed his mind about Pa, I recalled Johnson and Johnson's (1979) research relating cognitive development to constructive classroom disagreements, conflicts, and taking the other person's point of view.

Major Differences

Obviously, there are significant differences in what Susan and Carolyn were attempting to do, how they structured their classroom situations on those days, and how they interacted with their students. These differences are especially evident in four areas.

Content: Susan was reviewing highly structured and sequenced material. Knowledge of how to solve arithmetic problems is well known, or so it might seem. Because answers are predictable and controllable, this kind of content lends itself to statements of behavioral specificity.

Carolyn, on the other hand, was dealing with a more complex body of content, one that had no right or wrong answers that could be measured with the kind of precision that is possible in teaching equations. Her students were thinking about a problem given, as Heidegger (1968) noted, to a "multiplicity of meanings"; this "is the element in which all thought must move in order to be strict thought" (p. 71).

Content in both classrooms was significant, appropriate, and in accordance with students' cognitive developmental levels. It would have been interesting to analyze the reasoning of Carolyn's students to see how many of them might be using abstract concepts to support their arguments.

Teacher Roles: Susan was playing an active, direct role in controlling the classroom interaction. She posed all the questions and called on students at random to check comprehension. Carolyn similarly directed the discussion by posing all the questions, but she spent much more time saying nothing and listening to her students' judgments. She didn't even have to ask students to listen to what their classmates were saying; they listened automatically. Students were in control of making their own judgments and changing their minds. They controlled the length and the quality of the time because of Carolyn's nondirectiveness, which was perfectly appropriate.

Thus, teacher control varied from strictly direct with Susan to more shared-with-the-students in Carolyn's classroom.

Engagement Time: Susan may have been more concerned with "allocated time, engagement rate, and success rate on school activities" because these factors are all directly related to student achievement (Denham and Lieberman, 1980). Carolyn's more free-flowing discussion was not as concerned with "success" in answering lower cognitive level questions. As she said, "I want the time to go on and on so they can feel free to allow ideas to come to them when they're ready. Sort of like brainstorming. The more time some of them have, the clearer their thinking—or the more opportunity they have to think about somebody else's argument." We do not expect Carolyn to move through her discussion at a brisk pace, keeping all students verbally involved with appropriate answers. Thinking takes time, and far too many of us inappropriately model Susan's behavior when confronting complex physical, social, or human problems.

Outcomes: The learning outcomes in Susan's class were easily measurable and highly focused. The outcomes within Carolyn's classroom can also be observed. They are, however, not as precisely focused and may be approached from a variety of perspectives or levels of difficulty: Did the students understand the story? Do they know Kohlberg's levels of moral development? Can they apply an external set of standards to a story? How well do they reason? For example, can they support their conclusions with evi-

dence? Can they identify assumptions, cause-effect relationships, and counter examples? These intellectual processes are more difficult to teach and measure, but not impossible.

These differences between Susan's and Carolyn's classrooms are directly related to the teacher effectiveness literature that emerges from elementary and junior high schools, where standardized achievement tests have been used to observe teachers' "effectiveness."

Foundational Elements

Within the teacher effectiveness research we have a knowledge base ("craft knowledge," as some call it) that structures and supports the learning task, just as the shell of a newly constructed house frames all the individual and creative appointments within the finished dwelling. To use a different analogy, this craft knowledge may provide the underlying structure for growth of the musician, from memorizing the scales to creating improvisations or variations on a theme by Beethoven. Learning scales and improvising themes require understanding the relationships, for example, between C Major and Minor and between triads, fifths, and sevenths. Individuals who do not understand these terms and how they are derived will have a difficult time growing from the rote learning phase to the point where they can think musically—that is, independently.

Structure for Learning

This research presents us with a well-delineated pattern for teacher behavior. Barnes (1981) presents these elements of "systematic instruction": (1) preparing students for the lesson, (2) teacher presentation of the lesson, (3) student practice after presentation, and (4) evaluation of student learning.

Good (1982) presents this model from the Missouri Mathematics Program: (1) daily review, (2) development, (3) seatwork, (4) homework assignment, and (5) special reviews.

It seems superfluous to reiterate that all teaching needs structure, but this research has re-emphasized two significant aspects of this structure: lesson preparation and development.

Barnes identifies four specific behaviors in her review that should be undertaken during the preparation phase: (1) secures students' attention, (2) states objectives, (3) gives or seeks a rationale for the lesson, and (4) reviews previous content.

Similarly, Good's *review* phase includes reviewing "the concepts and skills associated with the homework." In the next phase, *development*, he briefly focuses on prerequisite skills and concepts. It is important, he suggests, for students to see how concepts are related to each other.

Another important notion here is providing a clearly understood framework for learning. This framework consists of students' prior knowledge, the cognitive structures (or schema) within which they integrate such knowledge, and the new objective and its rationale. Too often we forget to set the stage for learning by helping students recall what they have already learned and how this may fit into an overall framework for the new skills or knowledge. Such practices have proven helpful in increasing student reading comprehension (Duffy and others, 1984).

On reading this research literature for the first time, I began to understand more clearly why graduate students sometimes said, in the middle of the semester, "I'm lost. I don't know where all this fits." I found it was necessary at the very beginning of the semester to attempt to create a structured overview of all the major concepts, showing salient relationships, and to return to that every week to help students integrate new learnings within this structure—in other words, to make it more meaningful.

It was evident to me when I observed Susan's classroom that students achieved such a high degree of successful recitation during this review partly because they had a clear academic focus. They had mastered the prerequisite skills and they understood the relationships between tens and ones, and how to prove these relationships. In Carolyn's classroom, similarly, students had mastered the different levels of moral development. They knew the story and they knew how to evaluate characters with a set of criteria. True, Carolyn did not follow the lesson format presented by Barnes, Good, or Rosenshine, but the principle of building on prior learnings that are well integrated within cognitive structures could be seen in the ensuing discussion.

Environment

Barnes' summary identifies two key elements of the learning environment: task orientation and affective supports.

> The terms "work," "task," or "academically-oriented" usually describe classrooms where teachers expect and require students to pay attention, work persistently toward completion of assignments, to exhibit cooperative attitudes, and in general, to concentrate on academic activities rather than socializing (1981, p. 7).

All of these behaviors were certainly evident in Susan's and Carolyn's classrooms. The 2nd graders were most attentive, raised their hands to participate, and socialized very little. Cooperation could be seen in their lack of competing for the teacher's attention with shout outs and "Ooooo, me, me, me!"

It was in Carolyn's classroom that the cooperative attitudes were even more evident. Here, students listened attentively, not only to the teacher but to each other as well.

Of even greater importance for the relationship between teacher effectiveness research and so-called "higher" levels of thinking are the "high achievement expectations" evident in this 5th grade. Carolyn was using an activity suggested to her for gifted students, but her class was composed of average students. Her challenge to these students and their enthusiastic and intelligent responses once again demonstrated to me the truth of the supposition that we often significantly under-challenge our students to think.

"Another broad variable, 'a warm, supportive environment,' was also consistently found to be positively related to student achievement in most of the studies reviewed here. . ." (Barnes, 1981, p. 9). Barnes lists the following teacher behaviors as contributing to such an environment:

1. Accepting student contributions.
2. Giving specific praise.
3. Respecting student contributions to the class.
4. Maintaining an orderly classroom.

Neither Susan nor Carolyn were "gushy" in their praise of students. They were businesslike in responding to student contributions. More important, however, were their acceptance of and respect for student contributions. Both Susan and Carolyn communicated a sense that each child's statement or question was very important. Moreover, I had a sense that the teach-

er was genuinely attempting to think herself into the children's frame of mind in order to understand their reasoning. This is what Buber called "imagining the other side," or visualizing the child's world view. Communicating this sense of respect is as important in these two classes as it is for a high school teacher challenging students to hypothesize about the origin of galaxies, or for a college professor who wishes students to consider this proposition: A woman should be President before the turn of the century.

Of all the factors mentioned in this article, it seems to me that creating this warm, supportive environment is perhaps the *sine qua non* for higher-level thinking. Without trust, open communication, and a willingness to tolerate and encourage differences, little thinking can occur. Thinking requires what Bronowski called "this constant adventure of taking the closed system and pushing its frontiers imaginatively into the open spaces where we shall make mistakes" (1978, p. 113). Going beyond the known into those new, unexplored territories and continents where we seek to make new connections and discoveries is risky business for the 5th graders analyzing Stegner's story and reconsidering his original perspective. The same is true for the adult reconsidering his analysis of a poem or her role as a professional.

Reflective Thinking: "Can you give us some examples of that, Beth?"

Instructional Processes

One of the ways in which teachers promote intellectual exploration of new ideas—as Carolyn did—is through their verbal interaction with students. The teacher effectiveness research speaks to several ways in which we promote learning of basic skills and higher-level mental processes. Barnes' summary cites these different teacher behaviors:

1. Varies question levels.
2. Probes, rephrases, prompts.
3. Waits for some response.
4. Provides answer to question.
5. Asks process questions. ("How did you get that answer?")
6. Stresses students' understanding of meaning.

Susan and Carolyn and teachers in higher grades use these processes as the situation demands. The research does not say we ask only recall questions; it says we ask the kinds of questions we need in order to maintain that active interaction so vital to learning.

Both Susan and Carolyn asked different kinds of questions to recall information, to explain answers with greater clarity, to build on previous comments. Neither one, during my observation, asked the process question, "How did you get that answer?" These process questions *seem* to be seldom used in classrooms, perhaps because we are so "right answer" oriented. Were we more dialogic in our thinking about teaching and learning, we might strive to find what Socrates might call the students' level or point of ignorance from whence we could begin to build new and meaningful relationships.

Finally, Rosenshine's recent summary of teacher effectiveness research stresses "overlearning" certain fundamental skills to the point where they become "automatic" (1983, p. 337). Susan's students solidly knew their addition and subtraction processes. But what did Carolyn's students know

well? They had learned, back in September, October, and November, that what was important in this 5th grade was thinking for yourself as well as thinking about what other people say and showing everybody the courtesy of attentive listening.

Systematic Instruction and Thinking

What helps all of these elements fit together is our definition of thinking. If thinking is the accumulation of knowledge, then certain teaching strategies are in order: presenting information, making certain it is received, and recalling it on demand. Freire (1974) called this the "banking concept" of education.

If, however, we accept Hannah Arendt's definition of thinking, we will proceed differently. Thinking is "the quest for meaning" as opposed to the thirst for knowledge that is verifiable primarily through rules of logic. Thinking proceeds by means of "analogies, metaphors, and emblems" that are the "threads by which the mind holds onto the world . . . Thinking always 'generalizes,' squeezes out of many particulars . . . whatever meaning may be there" (Arendt, 1977).

Thinking, therefore, is a process of searching for and creating meaning involving the mind's creations—symbols, metaphors, analogies—in an attempt to establish relationships between the world of particulars and the ideas and concepts that give them structure. For example, 2nd graders figuring out one math problem must know how this problem relates to the general concepts of tens, ones, and proofs before they can accomplish the task with understanding. Carolyn's 5th graders are making the characters in "The Colt" more meaningful by applying a different set of lenses (Kohlberg's stages of moral development) to them. Thinking becomes more complex as we move from 2nd to 5th grade, but it is still thinking, searching for meaning.

All the teacher effectiveness research stresses this search for meaning. Barnes (1981) speaks of the teachers' emphasizing "students' understanding of meaning." Good (1982, p. 15), in speaking of the Missouri Math Program, noted that "the instructional activity is initiated and reviewed in the context of meaning." The stress that

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both these researchers place on asking process questions—"How did you get that answer?"—is evidence that students are being challenged to think, not merely recite information mindlessly. In a 3rd grade I recently observed, students were coloring in a chart with nouns and many comparative adjectives (tall, taller, tallest, for example). When I asked what they were doing, a few said, "Coloring in all the *er* and *est* words." They didn't know how adjectives related to nouns or other adjectives. This was a mechanical operation without meaning beyond coloring in the letters.

Goodlad (1984) has noted that almost half the early elementary school students he interviewed for his massive Study of Schooling did not clearly understand what their teachers wanted them to do. We must ensure that learning includes not only knowing how to define kinetic energy but, more important, how to use this concept to explain and compare physical phenomena.

Conclusion

I have attempted to provide a partial refutation for the claim that current research on teacher effectiveness has no significant implications for thinking at higher grade levels or in more complex human situations. By considering the structure, environment, teaching processes, and the nature of thinking itself, this research may be foundational for more complex thinking.

It is true that thinking in Susan's class is more convergent and concerns content that is much more hierarchical and structured than in Carolyn's class. However, if, with Gilbert Ryle (1979), we view thinking as more like path-creating than path-following, we will see the child's first spelling of "cat" as a thoughtful endeavor.

The real danger in using teacher effectiveness research is that it may become prescriptive, a set of behaviors to be checked off by the supervising administrator. Active teaching should become what Good calls an "orienting concept" that fosters reflective thinking about our own teaching processes and their intended and unintended outcomes. We should use this research to stimulate our critical and imaginative thinking about how to help children, adolescents, and adults search for and create the relationships that result in meaningful learning.□

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