

Tip of the Month - Asking Questions and Engaging Students in Thinking (part 2)

Dr. Michael Clough - Iowa State University

Effective teaching is a highly interactive activity, and while interesting activities spark students' curiosity, several research-based teacher behaviors implemented in concert are needed to establish meaningful interactive environments. To begin, intellectually engaging extended-answer questions help stimulate and focus students' thinking while helping the teacher understand students' thinking. Extended-answer questions are phrased to avoid "yes/no" responses and begin with words such as "how" or "what" rather than "can", "did", or "will". The expectations created by these subtle changes in phrasing raise the intellectual climate that permeates a classroom.

Just as important, initiating questions at an appropriate level of difficulty and then moving towards more challenging questions is necessary to avoid intimidating students and stifling interaction. Numerous classification systems for questions exist, but most of these are based on a taxonomy of cognitive objectives introduced by Bloom, *et al.*(1956). More recently Penick *et al.* (1996) suggested a questioning strategy that emphasizes students' prior experiences and using these experiences to build relationships, apply knowledge, and create explanations (see below). While effective questioning need not always begin in any one place nor occur in a linear sequence (Good and Brophy,1994), attending to a question's level of difficulty and progression is critical for encouraging student participation.

HRASE Questioning Hierarchy Suggested by Penick, Crow and Bonnstetter (1996)

History—questions that relate to students' experience:

- What did you do . . . ?
- What happened when you . . . ?
- What happened next . . . ?

Relationships—questions that engage students in comparing ideas, activities, data, etc.:

- How does this compare to . . . ?
- What else does this relate to . . . ?
- What do all these procedures have in common?

Application—questions that require students to use knowledge in new contexts:

- How could this idea be used to design . . . ?
- What recognized issues could this solution solve?
- What evidence do we have that supports . . . ?

Speculation—questions that require thinking beyond given information:

- What would happen if you changed . . . ?
- What might the next appropriate step be?
- What potential problems may result from . . . ?

Explanation—questions that get at underlying reasons, processes, and mechanisms:

- How does that work?
- How can we account for . . . ?
- What justification could be provided for . . . ?

Unfortunately, teachers who improve their questioning are often frustrated when student interaction does not immediately increase. While questions set an academic mood, they alone do not encourage students to ponder and respond. Thought-provoking questions require time for thinking, yet teachers often wait less than one second after asking a question before moving on in some manner that conveys to students they need not respond. Increasing wait-time I, the amount of time that teachers wait after having asked a question to *at least* four seconds (significantly more in some situations) along with incorporating wait-time II—the amount of time a teacher

waits after a student has answered a question—has been shown to result in the following desirable outcomes (Rowe, 1974 a and b, Rowe, 1986):

- length of student responses increases by 700%;
- number of unsolicited, but appropriate, responses increases;
- failures to respond decreases;
- confidence, as reflected in decrease of inflected responses, increases;
- incidence of speculative responses increases;
- more inferences are supported by evidence and logical argument;
- incidence of student-student comparisons of data increases;
- the number of student questions and proposed experiments increases; and
- the incidence of responses from students rated by teachers as relatively slow increases.

Simply by keeping quiet at appropriate times is imperative in creating an environment that facilitates significant student interaction and helps achieve a number of desired student goals.

And yet, effective questioning along with appropriate wait-time is often still insufficient for enticing many students to "risk" responding. The need for teachers to recognize the synergy of education research is perhaps best illustrated by an experience one of my former student teachers had years ago. After a particularly frustrating teaching experience, he was assessing his performance and the discussion turned to his interaction pattern, beginning with the kinds of questions he asked. After agreeing that his questions were well phrased, developmentally appropriate, and within students' ability to answer, I then asked him about his wait-time. His answer was intriguing both in its content and its message about the complexity of understanding research. He said, "I used extensive wait-time—wait-time doesn't work!" My response was to ask how else we might account for students' reluctance to answer his questions. After some time the issue of his non-verbal behaviors was raised. What was apparent to the students and I was that his non-verbal behaviors communicated a quite different message than did his extensive wait-time. Answering a teacher's questions, particularly in front of peers, can be a terribly intimidating experience for many students. An intellectually safe environment can be promoted, in part by exhibiting a number of non-verbal behaviors alongside appropriate questions and wait-time. Body language and how long a teacher waits for an answer communicates how open a teacher is to student responses. Teachers who genuinely want student interaction will appropriately incorporate non-verbal behaviors such as smiling, proper eye-contact with students all around the classroom, movement around the room and among students, leaning forward when students are speaking, raising eyebrows to show interest, inviting hand-gestures (Bavelas *et al.*, 1995; Roth, 2001), equality of status, and wait-time I and II..

However, even more is required for promoting and maintaining student interaction. Carefully listening to students and sensitively responding to what they say is imperative for creating an intellectually safe environment that encourages students to bare their thinking. Rather than evaluating student responses, teachers should encourage interaction by acknowledging student ideas, writing students' ideas on the board, using student ideas as a focus for further instruction, asking students to elaborate, and asking for the implications of proposed ideas. None of this means that all student answers are accepted as correct. Instead, by using student ideas for further thinking and discussion, the focus of the discussion moves from a sole concern for right answers to reasoning and justification for ideas (correct or incorrect).

I refer to the synergy that results from effective questioning, positive non-verbals, listening, wait-time, and responding that further engages students as the central core of effective teaching practices. The importance of these behaviors is that they are the essential "tools" teachers *always* have at their disposal for understanding students' thinking, promoting student understanding of content, and advancing all the student goals. Moreover, it emphasizes that teaching is, above all else, an activity centered on human interaction. It rightfully places the teacher together with students as the focus of education and education reform.