

Whys and Ways of TEACHING

Published by the Faculty Center for Instructional Excellence

September 1996, Vol. 7, No. 1

Asking and Answering Questions

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Asking questions and answering them are complex tasks that go to the heart of what we do as instructors. All too often questions fall flat with no student takers. Our answers are met with looks of consternation, failing to ignite discussion. Students resist instructor "thought" questions or they balk at questions that have no clear-cut answers. The purpose of this article is: 1) to examine several related factors which together often determine the success of techniques we use to ask and answer questions and 2) to offer strategies to assess and improve approaches to questioning.

The six interrelated areas include: 1) the types of questions we ask, using Bloom's Taxonomy; 2) the sociocultural dimension to questioning: more specifically, the impact of race, gender, class and cultural differences in our classrooms; 3) the role of student development, as defined by Perry and Belenky's stages of intellectual development; 4) the role of learning style preferences, as defined by the Myers-Briggs Type Indicator, and finally, 5) what research tells us about effective strategies for Q and A in our classes.

Bloom's Taxonomy

Bloom's Taxonomy of Educational Objectives is the most often cited model of questions used in higher education. The hierarchy of cognitive questions include Knowledge and Comprehension items, often referred to as lower-order questions, and Application, Analysis, Synthesis and Evaluation items which are all considered higher-order questions. The Table on pg. 2 summarizes these levels. (Bonwell and Eison, 1994)

Faculty consistently identify higher-order critical thinking skills as a primary instructional goal and

yet research indicates that in most (but not all) disciplines, over 90% of teacher questions are at the Knowledge and Comprehension levels in class and on exams. The same is true for textbook study guide questions and published exams (Bonwell and Eison, 1994).

The disparity is worth noting. You get what you ask for, or as Suzanne Langer noted: the questions we ask determine the answers we can derive.

1) One place to begin is to assess the levels of questions you ask to determine whether they achieve the instructional goals you have set for yourself and your students. A range of questions is often optimal and motivating for students, offering numerous points of entry to participate for students of different skill levels.

2) Compare the questions you ask in class with those you use for assessment. They should be comparable. All too often faculty save their best thought-provoking questions, the ones that require analysis, synthesis, application and evaluation, for their exams, leaving students frustrated and unprepared. When students say an exam is *unfair* or *tricky*, they are often indicating that the instructor has used a different level of inquiry than typically used for class discussions and assignments. Review sessions and teacher-made study guides (if presented as questions or tasks, not topics) offer a productive safety net by offering students a preview of the levels of questions which will be required on exams.

The sociocultural dimension: the impact of race, gender, class, and cultural differences in our classrooms.

There is a large and growing body of research on diversity issues in the college classroom. Much of

Major Categories in the Cognitive Domain of the Taxonomy of Educational Objectives (Bloom, 1956)

Source: Gronlund, N. E., & Linn, R. L. (1990). *Measurement and evaluation in Teaching* (sixth edition). NY: Macmillan. Pp. 506-507.

This chart was prepared by Charles Bonwell and James Eison (1994), and is reprinted with their permission.

Descriptions of the Major Categories in the Cognitive Domain		Illustrative General Instructional Objectives	Illustrative Verbs for Stating Specific Learning Outcomes
1. Knowledge. Knowledge is defined as the remembering of previously learned material. This may involve the recall of a wide range of material, from specific facts to complete theories, but all that is required is the bringing to mind of the appropriate information. Knowledge represents the lowest level of learning outcomes in the cognitive domain.		Knows common terms Knows specific facts Knows methods and procedures Knows basic concepts Knows principles	Defines, describes, identifies, labels, lists, matches, names, outlines, reproduces, selects, states
2. Comprehension. Comprehension is defined as the ability to grasp the meaning of material. This may be shown by translating material from one form to another (words or numbers), by interpreting material (explaining or summarizing), and by estimating future trends (predicting consequences or effects). These learning outcomes go one step beyond the simple remembering of material and represent the lowest level of understanding.		Understands facts and principles Interprets verbal material Interprets charts and graphs Translates verbal material to mathematical formulas Estimates consequences implied in data Justifies methods and procedures	Converts, defends, distinguishes, estimates, explains, extends, generalizes, gives examples, infers, paraphrases, predicts, rewrites, summarizes
3. Application. Application refers to the ability to use learned material in new and concrete situations. This may include the application of such things as rules, methods, concepts, principles, laws, and theories. Learning outcomes in this area require a higher level of understanding than those under comprehension.		Applies principles to new situations Applies theories to practical situations Solves mathematical problems Constructs charts and graphs Demonstrates correct usage of a procedure	Changes, computes, demonstrates, discovers, manipulates, modifies, operates, predicts, prepares, produces, relates, shows, solves, uses
4. Analysis. Analysis refers to the ability to break down material into its component parts so that its organizational structure may be understood. This may include the identification of the parts, analysis of the relationships between parts, and recognition of the organizational principles involved. Learning outcomes here represent a higher intellectual level than comprehension and application because they require an understanding of both the content and the structural form of the material.		Recognizes unstated assumptions Recognizes logical fallacies in reasoning Distinguishes between facts and inferences Evaluates the relevancy of data Analyzes the organizational structure of a work (art, music, writing)	Breaks down, diagrams, differentiates, discriminates, distinguishes, identifies, illustrates, infers, outlines, points out, relates, selects, separates, subdivides
5. Synthesis. Synthesis refers to the ability to put parts together to form a new whole. This may involve the production of a unique communication (theme or speech), a plan of operations (research proposal), or a set of abstract relations (scheme for classifying information). Learning outcomes in this area stress creative behaviors, with major emphasis on the formulation of new patterns or structures.		Writes a well-organized theme Gives a well-organized speech Writes a creative short story (or poem) Proposes a plan for an experiment Integrates learning from different areas into a plan for solving a problem Formulates a new scheme for classifying objects (or events or ideas)	Categorizes, combines, composes, creates, devises, designs, explains, generates, modifies, organizes, plans, rearranges, reconstructs, relates, reorganizes, revises, rewrites, summarizes, tells, writes
6. Evaluation. Evaluation is concerned with the ability to judge the value of material (statement, novel, poem, research report) for a given purpose. The judgments are to be based on definite criteria. These may be internal criteria (organization) or external criteria (relevance to the purpose) and the student may determine the criteria or be given them. Learning outcomes in this area are highest in the cognitive hierarchy because they contain elements of all of the other categories plus value judgments based on clearly defined criteria.		Judges the consistency of written material Judges the adequacy with which conclusions are supported by data Judges the value of a work (art, music, writing) by use of internal criteria Judges the value of a work (art, music, writing) by use of external standards	Appraises, compares, concludes, contrasts, criticizes, describes, discriminates, explains, interprets, justifies, relates, summarizes, supports

it focuses on differential treatment of diverse students by instructors, particularly as it relates to asking and answering questions.

The Sadkers' research on gender differences in teaching, for example, indicates that male students get more attention in the classroom by instructors of both sexes, including more of our questions and answers, more lengthy and detailed explanations, more probing and challenge in response to their answers, more eye contact and positive non-verbal communication. Many of our answers and explanations are in terms of male sports metaphors and examples. Women of color get the least attention from faculty of both genders. ("Inequity in the Classroom," 1991)

Many foreign students have been socialized not to challenge the authority of an instructor or to ask questions or inquiries lest their queries imply a lack of respect. Many of these students will not engage in class discussions voluntarily and have been raised to devalue student talk, both student comments in class and group work. There are several things you can do both proactively and reactively. Clarify that you truly welcome questions and are not hurt or insulted by them. Encourage them to come in for office hours so that you can better assess their individual needs and attitudes. If you use group work, provide a clear rationale and help them to envision what is expected of them. And last but not least, learn to pronounce their names correctly. Model your efforts to learn their names and use them when you call on them.

Many women, students of color, foreign students, and reticent students are reluctant to speak spontaneously in class. If you wish to call on these students, you may want to try mediated participation as a first step. One example of *mediated participation* is to ask students to contribute to class discussion from previously prepared written materials, often class assignments. The students only have to read their work aloud, rather than offer spontaneous responses. It allows their voices to be heard in ways that are often less threatening to them. Alternatively, you can ask a question and ask students to spend a minute or two writing their responses. While they are doing that, walk around the room and preview their responses. If you see responses that are particularly strong from reticent students, use that opportunity to call on them, confident that they will have a successful experience in contributing to class.

And finally, use technology to reach and engage students who may be reluctant to speak in class. Use computer conferences, email or class bulletin boards to ask and answer questions. Many students who will engage in electronic discussions feel empowered by them and later contribute more in class.

To see how you are doing, you could conduct an audit of who participates in class, looking at who raises their hands, who gets called on to speak, who engages in extended dialogs both in class and outside of it with you. It can be done with the assistance of a colleague or instructional development staff who can visit your class as an observer, by videotaping your class, or by a self audit. Many faculty assess class participation generally, if only informally by thinking back on how many students spoke during a class period, but only on closer examination do they discern the differential patterns of participation by gender, race or culture.

The role of student development as defined by Perry and Belenky's stages of intellectual development.

Student development plays a profound role in student readiness to engage in inquiry, particularly higher-order critical thinking. When students get frustrated with us for answers that reflect disciplinary uncertainty or ambiguity, when students want nothing less than definitive solutions and demand the "right" answer, when students declare that their opinion on the topic is just as valid as an expert or when they feel contempt that we don't know something because instructors are supposed to be the "experts," they are speaking from developmental stages that limit and define their perspectives. It is helpful to recognize what stage students are at so that instructors can provide answers appropriate to that level of understanding and expectation. When we don't, the answer is often rejected, misunderstood, or recast to fit their world view. We can't always be expected to take this into account in our classroom interactions, but often the thorniest classroom situations can be explained by developmental stage. Forewarned is forearmed.

The Perry Scheme of Intellectual and Ethical Development, first proposed by William Perry in 1970, in combination with the work of Mary Belenky and her associates offer a model of development particularly useful for college teachers. Based on their research with college

students, Perry (1970, 1981) and Belenky et al., (1980) found that students enter college with a simple view of knowledge that limits their ability to understand complex issues. Although Perry's initial work was with males and Belenky's work was with females, both conclude that most students progress through a series of transitions to more effective modes of thinking over the course of their collegiate education. (Erickson and Strommer, 1991; Nelson, 1989) The schema's main stages have been summarized on the chart on pg. 5, below.

Many first year students, particularly traditional aged students, enter college as dualistic thinkers (Dualism/Received Knowledge), expecting the instructor to be the ultimate authority, to have definitive answers and reduce all knowledge to that which is right or wrong. It is often useful for instructors to speak to the issue directly by clarifying that authorities in the discipline disagree on key concepts, that there is uncertainty in many areas of the field, that there are multiple possible interpretations, some more valid than others. Acknowledge student concerns by indicating that you know that many of them enter college with expectations about the role of faculty and about the nature of knowledge and learning that are being challenged and you understand that it is frustrating for them. For many students, these will be shocking revelations and they will need to hear them repeatedly and have them reinforced. In freshman classes in particular, there are inevitable clashes as students demand facts, memorization and certainty from instructors who value and accept multiple perspectives and ambiguities.

Students entering the second stage (Multiplicity or Subjective Knowledge) often believe that whatever they think is valid and that they are entitled to their opinion. Tall stories are as good as short ones. It is the Baskin-Robbins approach to thinking: there are a lot of flavors, we're all free to choose whatever we like, and no one can say that one is better than the other. It comes from the profound shock that if there isn't a definitive right and wrong, then surely, anything goes. The role of the instructor in this stage is to focus on helping students make informed decisions based on evidence and reasoned criteria and to reinforce that some interpretations are better than others.

One of the most difficult challenges of this stage for instructors is that students may begin to feel that college is all a big game, that all knowledge is subjective. Student's will play the game and give

the instructor what he or she wants to hear but go on thinking whatever they please. For this reason, it is important for instructors to give students opportunities to voice their views, whatever they may be, and hold them up to the light of day without fear of public humiliation for being candid. If students are ridiculed for voicing their beliefs, no matter how unreasonable, the ideas go underground where they remain unexamined and unchallenged. One approach that feels safe and unthreatening but that is often facilitative is to ask how they developed their ideas on the subject or what was the origin or basis of their beliefs. This often leads to productive re-examination of an issue without putting students on the defensive.

While the majority of students move from Dualism to Multiplicity between their first and second years of college, the move from Multiplicity onward is much slower. Acceptance of complexity and analytical tools (Relativism) takes time to develop. And once students have developed these capacities, it takes even longer to choose among options (Commitment to Relativism or Constructed Knowledge).

Perry and Belenky's schemes are rich with implications for teaching. For our purposes here, it is sufficient to identify student development as a significant dimension of asking and answering questions. For many instructors, it is a source of solace to know that many forms of student resistance to concepts we teach are related to issues of student development.

The role of learning style preferences as defined by The Myers-Briggs Type Indicator (MBTI).

The term *learning styles* refers to preferences for some kinds of learning activities over others. A learning style preference does not imply an inability to perform in other modes, only a preference to do so that makes the activity easier and in some cases more enjoyable. These preferences refer to how people learn, not what or how much they learn. (Erickson and Strommer, 1991)

There are many models of learning styles; the MBTI is one that is commonly used in higher education, business and career planning. The Myers-Briggs Type Indicator (MBTI) is a relatively complex assessment of learning styles. It measures preferences for four bipolar dimensions and identifies sixteen personality types, each with a

Perry and Belenky Models of Intellectual Development

Dualism (Perry) / Received Knowledge (Belenky)

- View of Knowledge:** Knowledge is facts, information and right answers.
- View of Instructor:** Instructors are authorities who know the facts.
Teaching is telling students those facts.
- View of Learning:** Learning is recording information in notes, committing it to memory, and feeding it back as answers on the test.
- Challenges:** Uncertainty or disagreement among "authorities."
Multiple perspectives or more than one answer.
Questions or assignments that require independent thought.

Multiplicity (Perry) / Subjective Knowledge (Belenky)

- View of Knowledge:** In some areas, truth is not yet known. Differences of opinion are legitimate.
When the facts are not known, one theory or opinion is as good as another so long as it makes sense.
Students gradually discover that academics have rules for making sense.
- View of Instructor:** Instructors' opinions are no better than students'.
However, instructors know how to make sense - how to support opinion in academic settings.
Teaching is showing students how to think.
- View of Learning:** Student's job is to learn how to play the academic game, how to think and how to support opinions.
- Challenges:** Assignments that call for informed opinions, reasoned judgments, evidence and documentation.
Idea that some opinions are better than others.
Evaluation of student work.

Relativism (Perry) / Procedural Knowledge (Belenky)

- View of Knowledge:** Knowledge is not facts and right answers nor is it anyone's opinion.
Student's now see complexity in problems and issues, the needs for systematic analysis, and the importance of evidence.
- View of Instructor:** Instructors may not have answers but they know discipline's methods of analysis.
- View of Learning:** Learning is developing skills for dealing with complexity:
thinking about several factors or views.;
looking at a situation from different perspectives.;
using systematic methods of analysis.;
gathering evidence and supporting conclusions.;
seeing strengths and limitations of analytical methods.;
- Challenges:** Taking a position or choosing among alternatives.

Commitment in Relativism Perry) / Constructed Knowledge

- View of Knowledge:** Knowledge is still contextual and relative, uncertain and tentative. Yet it is possible to take positions, make choices, commit oneself.
- View of Instructor:** A model of someone who is fully aware of uncertainty yet has the courage to make commitments.
Teaching is challenging and encouraging students to explore complexities fully and then to take a stand.
- View of Learning:** Students seek understanding of complexities not just as academic pursuit but also in order to create a world view, one from which they will make commitments and choices.

different set of preferences for learning. The chart on pg. 7 identifies the four bi-polar dimensions.

Two of the dimensions have implications particularly for teaching lowerclassmen: Extraversion-Introversion and Sensing-Intuition. The Extraversion-Introversion scale measures preference for the outer world of people vs. the inner world of ideas. Extraverts rely on activity and think best when talking, learn well in groups, and may have difficulty sitting and reading for extended periods of time. Introverts need quiet time for concentration and study, they think best when alone, and often need time to process their thoughts before speaking. Introverts are more comfortable with teacher directed classes that rely heavily on lecture and solitary study. In contrast, Extraverts enjoy group work and get restless if asked to listen to a lecture too long without a chance to discuss the material with others. A recent study of college freshmen at the U of Rhode Island indicated that a large majority of lower classmen are Extraverts while faculty are predominantly Introverts. This is true at several institutions (Erickson and Strommer, 1991, 1995). The difference often leads to instructional decisions by faculty that are out of sync with student learning needs and preferences as instructors use methods that reflect their own learning styles. This difference helps to explain comments on student evaluations such as, "The instructor lectures too much," or "Students should have more time in class to speak with other students." The preponderance of student Extraverts suggests that many of our students are eager to engage in discussion if given a chance to do so.

The Sensing-Intuition Scale indicates preference for perceiving the world through experience vs intuiting meaning and possibilities. Sensing students focus on the concrete aspects of the here and now and prefer to look at the facts and details to be mastered. Sensing students also like to use what they have learned. They are practical, concrete, and realistic. They want teachers to give clear directions that are concise. In contrast, intuitive types don't like routine or overly structured or mechanical approaches to learning. They want to let their imagination and instincts work. They prefer open ended assignments and flexibility. They are reluctant to observe details and learn facts but can often grasp the big picture and envision new and creative approaches and models. In the context of asking and answering questions, it is likely that Sensing types will respond more readily to questions that address

detailed information, application and practical uses. Intuitive types will respond well to conjectural questions, such as "what if" inquiries and opportunities to explore creative options.

Many faculty use MBTI classifications when forming student groups. Some faculty arrange for their classes to take the short form of the MBTI and use their profiles to assign students to groups. Other faculty simply apply their knowledge of the MBTI classifications to what they know about individual students to ensure better balance in the groups they create. All EMU students can take the MBTI free of charge if they enroll in the MBTI workshops at the Career Services Center.

What research tells us about effective strategies for Q and A in the classroom.

Wilten and Clegg (1986) synthesized the recommendations of five research reviews on questioning techniques that are positively correlated with student achievement. *The Teaching Professor* (1994) summarized their findings. Effective teachers:

- 1) phrase questions clearly. Many instructors ask questions that contain two or three questions or the same question stated in different ways. This confuses students. Ask one question at a time.
- 2) ask primarily academic questions. There is a place for procedural, affective and personal questions, but academic questions are most highly correlated with student achievement.
- 3) ask both low and high level cognitive questions. Recitation, review and drill may be appropriate for the acquisition of basic skills. Higher order thinking requires other types of questions.
- 4) wait 3-5 seconds of wait time after asking a question. Research indicates that most faculty wait far less time than that before moving on or answering it themselves.
- 5) encourage all students to respond to each question in some way, either by writing their responses, discussing it with a student sitting next to them, or waiting for everyone to consider it before calling on students.
- 6) balance responses from volunteers with non-volunteers. This addresses the problem of students who dominate the class. Research indicates that it is productive to call on non-

MYERS-BRIGGS TYPE INDICATOR AND LEARNING STYLES

Extraversion/Introversion

Need to experience the world to understand it.
Rely on activity.
Learn by talking things through.
Like to work in groups.
Need active breaks when reading or writing.
Tend to leap into assignments, sometimes without thinking
Rely on trial and error.

Like to understand the world before experiencing it.
Need quiet for concentration.
Learn by thinking things through.
Like to work in solitude.
Comfortable with long stretches of solitary study.
Like to think things through and plan before starting assignments or tasks; need to know discussion questions in advance.

Sensing Types/Intuitive Types

Focus on concrete aspects of the here and now.
Master first the facts and details; prefer inductive approaches that move from the concrete to the abstract.
Like to put what they've learned to use.

Like an established way of doing things.
Usually reach a conclusion step by step; tend not to trust inspirations or hunches.

Look for general impressions, the "gestalt."
Master first the theories and concepts; prefer deductive approaches that move from the abstract to concrete.
Like to learn new skills; less concerned about using them.
Dislike routine or doing the same thing repeatedly.
Follow inspirations and hunches; impatient with checking facts or taking time for precision.

Thinking Types/Feeling Types

Interested in learning principles that govern the way the world works.
Tend to anticipate logical outcomes of choices.
Make decisions by considering logical consequences.
Need to be treated fairly.

Interested in learning things that serve people or personal values.
Tend to think about the effects of choices on people.
Make decisions by considering what they value and what's important to people.
Need occasional praise.

Judging Types/Perceiving Types

Gauge academic progress by their accomplishments.
Work best when they can plan and follow the plan; like clear goals and deadlines.
Like to focus on one task at a time until it's finished.
May decide things too quickly.

Depend less on accomplishing tasks to feel they're learning.
Do not mind making last minute changes; tend to feel imprisoned in highly structured courses.
May start too many projects and have trouble finishing any.
Tend to feel they don't have enough information to decide.

Reprinted from materials developed and distributed by Erickson and Strommer (1991).

volunteers particularly if there is a high likelihood that they will know the answer.

7) ask questions that are answered correctly about 70% of the time and offer assistance to students when answers are incomplete or incorrect. In short, the level of difficulty of the questions should allow for most questions to be answered correctly.

8) probe student responses for clarification or support. These responses add focus, emphasis or elaboration.

9) acknowledge correct responses but be specific and discriminating in your praise. Too much praise for correct responses can appear condescending and makes incorrect responses more problematic.

William Cashin (1995) offers a useful list of effective strategies for questioning, many of which elaborate on the ones cited above.

When students ask questions.

1) Repeat the question, paraphrase it and ask if you have understood the question. This ensures that the whole class heard it, lets the questioner know you understood it and gives you and the students time to think about it. When you have not completely understood, the student will often elaborate as he/she rephrases it, thinking out loud.

2) Redirect the question. Ask the entire class or a student to venture an answer or comment. It encourages wider class participation and reinforces that students are resources too. Keep it going. Ask for additional student responses to student comments.

3) Promote discussion among students. In response to the question, open it to discussion by student buzz groups and then reconvene the class to hear what the groups had to say.

4) Do not respond by asking the student to look it up. Such a response is seen as a punishment and tends to silence student questions.

Answering questions.

1) One option is to answer the question directly. This approach is best used when students could not possibly do so, such as when they are asking for your opinion or when other students would not have the information. Try to be brief and to the

point and check to see that you have answered the question, e.g., "Does that answer your question?" or "Was that what you were asking?"

Instructors will often use a student question to bring up a related but different topic. Try to answer the student's question *first* and then move into the related topic.

2) Postpone answering the question. Students are most likely to learn and remember if the instructor answers questions when they are asked. But there may be times when it is useful to postpone them. If you are short of time, it requires a complex answer, or it will be covered in a later class, offer to answer the question after class and clarify why you are postponing the answer. When you do answer it in a subsequent class, refer back to the original question. In balance, answer more questions when they are asked than you postpone or students will stop asking questions.

3) Discourage inappropriate questions. Sometimes a student asks an inappropriate question or one that is far afield from the discussion at hand. You can suggest that the student see you after class or put it to a class vote to see how many students want to discuss it then. If only a few students want to discuss it, offer to see them after class.

4) Admit when you do not know the answer. Just say so and couple it with an indication that you will look it up (if you are willing) and even describe how you will go about that to clarify research and resources in your discipline. If you do look it up, report the findings to the entire class, not just the student who asked. Indicating that you don't know tends to engender greater confidence that you speak with authority at other times. They will trust that you will tell them if you don't know. Bluffing undermines your credibility. Cashin recommends that unless the question is outside the parameters of your course, you should look it up.

Asking Questions.

1) Ask open-ended, not just close-ended, questions. A close-ended question usually can be answered with a *yes* or *no* or a short, often factual answer. An open-ended question leaves the form of the answer up to the responder and usually elicits much more information and thinking.

Close-ended questions are more appropriate to check whether students remember specific information, to check procedural steps or to get their attention. Open-ended questions are far better to encourage student participation and complex thought.

2) Ask divergent as well as convergent questions. Convergent questions usually have single or accepted correct answers and reflect conventional wisdom. Divergent questions have many possible answers, some or many of which are acceptable and often require new and creative insights. This dichotomy corresponds to the Sensing-Intuitive dimensions of the MBTI. See above. Sensing types prefer convergent questions and Intuitive types prefer divergent questions, although all students benefit from both kinds of inquiries. When we talk about higher-order critical thinking skills, however, divergent questions are usually in order.

3) Pauses and silence. As mentioned in the Wilen and Clegg (1995) study above, pauses and silence can be very productive. Wait time, pauses and silence are not inappropriate, even if they are often uncomfortable. They give students time to reflect, to do a quick review of what they know and to organize their thoughts and the words to express them. The higher order the question, the more time that is required to answer it. If the silence seems deafening, acknowledge it with a prompt reply such as, "Yes, this is a difficult question and needs time to consider all the issues. Take the time you need." And then wait. Alternatively, ask students to jot down their thoughts and indicate that you'll call on some students in two minutes. If it is an important question and no hands go up, ask students to form buzz groups and discuss the issue with others. Then reconvene the group to hear some answers. Avoid diving in to fill the space by answering your own question. If students see you doing that, they will simply wait until you give them the answer.

Creating an Accepting Atmosphere.

Students won't speak in a class in which they are afraid of being humiliated or embarrassed. The following strategies help ensure that the environment is safe and friendly.

1) Ask for questions. Pause after you introduce a difficult topic and ask for questions. Make a point that you are indeed waiting for questions. Sometimes an instructor's non-verbal behavior belies her or his invitational words. Looking at

your watch or the clock, pacing, or tossing chalk indicate impatience to move on and that despite the request for questions, they are not really welcome. Read the non-verbal behavior of students. When they look puzzled or frustrated, stop and ask the class a question that will tell you if they have understood and are with you. Often students are so lost they cannot even articulate a question. Or take a class vote: "How many of you would like me to take some time to recap what we just discussed?" There is strength in numbers. Some students will vote *yes* when they would not have expressed their confusion as a specific question. The old, "Is everyone with me?" or "Does everyone understand?" are rarely sufficient to uncover student questions.

And finally, use any of the successful classroom assessment techniques (CAT's) developed by Angelo and Cross (1993) which help identify what students know. CAT's tend to be anonymous, offering the instructor a quick way to determine if the class does understand. An example is the Muddiest Point. Ask students to write down the muddiest point in class and hand it in during break or at the end of class. A quick review of their responses will point directly to areas of student confusion and consternation, offering the instructor a place to begin the next class.

2) Answer questions. If a student's hand is up, call on him or her, even if you have to postpone the answer. If a student tends to monopolize in class, indicate that you would like to call on people who have not yet participated that day. If a student asks questions that are charged or hostile, it is often best to speak to the student after class or in office hours to uncover their concerns. Unmasking them in class is not usually a good idea for the student, the other students or the instructor.

3) Answer questions adequately. Your view of an adequate answer and the student's view may differ. Answer the question briefly and to the point, but follow it up with an inquiry about whether they felt their question was answered. This conveys a willingness to take the time needed to help them understand. If students are having trouble understanding your response, it often helps to enlist other students who understand the concept. Students will often offer the explanation in language that is more accessible to other students. If the student still does not understand, offer to see him or her after class, but be sure to extend the offer in a supportive tone or students may feel put-down.

4) Listen carefully to student questions. Let them know you are actively listening to them by looking at them and nodding as a way of indicating that you are following them. Repeating their question or comment is a clear indication that you have listened with care and heard them. Some faculty will busy themselves with other tasks while they take student questions, including sorting their papers, erasing the board or writing on it. These are seen as signs that the instructor is not listening and does not really want to hear the student's comments.

5) Do not put-down students. Whenever possible, avoid embarrassing students. A put-down will ensure that neither that student nor others will venture comments in the future. Rather than make a value judgment, ask a probing question.

Taken together, these five interrelated dimensions of questioning (level of question, student sociocultural characteristics, learning style, student development, and effective questioning strategies) explain much about the classroom dynamics we experience. They offer models and insights to describe and explain what we do when we ask and answer questions. They clarify why those efforts tend to succeed or fail. And, they offer us a myriad of approaches to improve our effectiveness in a complex task that goes to the heart of teaching and learning.

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