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Attachments: [Lewis - Developing Questioning Skills.pdf](#)

Teaching Toolbox: Wait Time as a Questioning Skill

by Emily O. Gravett

This week's Toolbox email follows up on a comment made on the last thread by David Peterson, who likened effective multiple-choice questions to those that also work well for spurring discussion in class. Along these lines, Karron Lewis, who works with [UT-Austin's Faculty Innovation Center](#), has prepared a helpful guide for "Developing Questioning Skills" (attached). It includes:

- general guidelines for question-asking
- an overview of specific levels of questions
- a discussion of the benefits of "wait time" (see below)
- suggestions for how to critique one's own questioning techniques
- a list of related references

Decades ago, science education innovator Mary Budd Rowe [extensively studied the simple concept of "wait time."](#) Wait time is the amount of time between when an instructor asks a question and when the instructor calls upon a student to answer that question (or answers the question herself). As reported by Lewis, Rowe found that the average wait time was a mere 1.5 seconds. Yet, when instructors extended their wait time to 5 seconds or more, Rowe discovered that:

- the length of students' responses increased
- students were more likely to articulate themselves in whole sentences
- speculative thinking appeared
- students used arguments based on evidence
- students shifted away from teacher-centered, show-and-tell kinds of responses to more student-student interaction
- the number of questions students asked increased
- instructors bought themselves time to listen and think
- teachers began to show more variability in the kinds of questions they ask

[Peer observations](#), offered through the CFI, can help faculty members gain insight into their own wait time, among other instructional choices. Please contact us if you're interested in learning more.

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Developing Questioning Skills

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The ability to ask and answer questions is central to learning. For more than two thousand years (since Socrates) the question has been an integral part of teaching. Only within the last decade and a half, however, has extensive research been directed to questions and questioning strategies. The information which has been generated from this research indicates that teachers largely have been asking the wrong questions. We have been focusing primarily on questions regarding the specific information students possessed rather than questions to promote learning.

The use of questioning skills is essential to systematic investigation in any subject area. In such an investigation 1) one asks questions to identify the reason or reasons for the investigation; 2) questions are asked to direct the search for information and to synthesize what has been discovered; and 3) the conclusions resulting from investigations are evaluated via questions. However, using questions to assist students' investigations is a relatively new technique in the schools. In the past, teachers primarily questioned students to ascertain whether or not they were learning the book content and to see if students were paying attention in class.

This shift in emphasis from learning solely content to learning processes is to enable individuals to deal intelligently with their world and their lives. If students can analyze their lives and the lives of others while in the school setting, they will comprehend effectively their reality when they are outside the formal school situation. Education today aims at the creation of a rational being. A rational being does not merely possess an effective memory; he/she must be able to react to data. He/She must be able to think and he/she must be active in seeking an understanding to problems.

Questions should play a central role in the learning process. Because of this, we as teachers need to plan our questions carefully. This doesn't mean script writing; that would negate creative teaching. However, it does mean we need to carefully plan our questions by thinking through possible questions which would guide the students toward further investigation and a deeper understanding of the concepts being stressed.

If a teacher utilizes questions effectively, students will discover that the question is a very valuable learning tool. It is a device through which they can organize their thinking to achieve certain objectives. Students who ask themselves questions as they deal with various learning

situations will provide themselves with data and will develop an awareness of where there are deficits in data. This type of knowledge is essential if students are to assume major roles in their learning process.

General Guidelines

Although it is essential that teachers ask questions that bring out the educational goals they are seeking, there is more to good questioning technique than simply asking the proper question. The following principles were developed by Richard L. Loughlin and provide an excellent set of guidelines for the teacher who wishes to develop good questioning techniques.

Principles of Questioning

1. Distribute questions so that all, including non-volunteers, are involved.
2. Balance factual and thought-provoking questions.
3. Ask both simple and exacting questions, so that the poorer students may participate and the brighter students may be extended.
4. Encourage lengthy responses and sustained answers. (Avoid yes-no questions, questions overlaid with afterthoughts, fragmentary questions, and those that tug or encourage guessing. NOTE: If you catch yourself asking a yes-no question, add "Explain.")
5. Stimulate critical thinking by asking: "To what extent?" "How?" "Under what circumstances?" "Why?" "Compare (or contrast)..."
 - a. Avoid: "Does anyone know...?" and "Who can tell us...?"
 - b. Allow time for thought. Wait until five or six want to speak.
 - c. Be a model of exact phrasing and coherent thinking.
 - 1) Phrase questions clearly, within the vocabulary limits of the class.
 - 2) Make each question specific, short, and proactive.

- d. Encourage students to comment on the answers of classmates.
- 1) Start the crossfire by asking, "What's your opinion of that answer...?"
 - 2) Follow up promising leads, building on contributions.
 - 3) Tactfully curb aggressive students. (No student or teacher domination should prevail.)
 - 4) Don't drop too quickly a student who seems unable to answer. If a student is nonplussed, inquire "How can we help...out?"
- e. Never interrupt a student who is attempting to answer nor tolerate ridicule of an honest effort.
6. Use the overhead technique: 1) question, 2) pause, 3) name.
 7. Insure audibility, then refuse to repeat questions or answers (Except in large classes *always* repeat questions and answers!)
 8. If a student asks a question, don't answer it until you've asked the class, "How would you answer that question...?"
 9. Personalize questions ("Pretend you are ... what would you do?")
 10. Suggest partnership by inquiring, "How can we ... ?"

From *The Education Forum*, 25, (May 1961), pp. 481-482.



Philip Groisser in his book, *How to Use the Fine Art of Questioning* (Groisser, 1964), has also listed ten procedures and considerations for effective classroom questioning.

Teacher's Check List for Artful Questioning

1. The teacher should pay attention to his/her questioning technique because it is a frequently used tool and the way to good teaching.
 2. Since method cannot be divorced from content, the teacher must master his/her subject if he/she is to perfect his/her questioning technique. There is no substitute for sound scholarship.
3. Questions must be guided by definite aims. They should be asked:
 - **to test a student's preparation** (Find out if students did their homework.)
 - **arouse interest** (Bring them into the lesson by motivating them.)
 - **to develop insights** (Cause them to see new relationships.)
 - **to develop ideals, attitudes and appreciations** (Ask questions that cause students to get more than knowledge in the classroom.)
 - **to strengthen learning** (Review and summarize what is taught.)
 - **to stimulate critical thinking** (Develop a questioning attitude.)
 - **to test achievement of objectives** (Check to see if what has been taught "sank in.")
 4. Good questions are:
 - **purposeful** (asked to achieve a specific purpose)
 - **clear** (students understand what they mean)
 - **brief** (stated in as few words as possible)
 - **natural** (stated simply, in conversational English)
 - **thought-provoking** (they stimulate thought and response)
 - **limited in scope** (only one or two points in chain of reasoning called for)
 - **adapted to the level of the class** (tailored to the kinds of students in the class)
 5. There is a language of questioning. In addition to "what," the teacher should ask "why" and "how." His/Her questions should call upon students to explain, illustrate, justify, trace, discuss, compare, contrast, agree or disagree, interpret, evaluate, and summarize.
 6. Question types that should be *avoided* include:
 - **yes-no** (These draw one-word -- Yes or No -- responses: "Does the square root of 9 equal 3?")
 - **elliptical** (These are vague: "What about the League of Nations?")
 - **tugging** (These place emphasis on rote: "Come on, think of a third reason.")
 - **guessing** (These encourage speculation rather than thought: "How long do you think man has been on earth?")
 - **leading** (These tend to give away answers: "How do vitamins help to build strong bodies and make up deficiencies?")
 - **vague** (These don't give students a clue as to what is called for: "Tell us about concave lenses.")
 7. Questioning will be *most effective* when questions are:
 - planned

- logical and sequential
 - addressed to the entire class
 - posed so students have time to think
 - balanced between fact and thought
 - distributed widely
 - not repeated
 - asked in a conversational tone
 - designed to elicit sustained responses
8. Handling answers is an important part of the questioning procedure. The teacher should be prepared to handle incorrect, partially correct and fully correct answers. Each type calls for careful follow-through.
9. Classroom discussion is based upon questions and answers. To be effective discussions should be:
- **significant** (concerned with something important)
 - **purposeful** (guided by a clear aim)
 - socialized (characterized by considerable student participation)
 - **guided** (helped by the teacher's questions and class management)
 - **open and honest** (conducted so that students can reach their own conclusions)
 - **ended with summary and conclusions** (tied up at the end so that students understand what has been said, and why)
10. In training students for classroom discussion, students should be trained to:
- speak up
 - give complete answers that include facts and reasoning
 - agree and disagree politely
 - wait to be recognized before speaking

From: Groisser, Philip L. *How to Use the Fine Art of Questioning*. Teacher's Practical Press, Inc., 1964, pp. 61-63.



Wait-Time

One questioning technique which is essential to the development of higher thought processes is **wait-time**. This is the amount of time that elapses between a teacher asking a question and calling upon a student to answer that question. The average teacher's wait-time is one second!! In a research project conducted at Columbia University by Mary Budd Rowe the following gains were reported when the teachers in the project increased their wait-time:

- | | |
|--|--|
| Student Responses Lengthen | 1. If you can prolong your average "wait-time" to five seconds or longer, the length of student responses increases. When wait-time is very short, students tend to give very short answers or they are prone to say, "I don't know." In addition, their answers often come with a question mark in the tone, as if to say, "Is this what you want?" |
| Whole Sentences | 2. . . .you are more likely to get whole sentences, and the confidence as expressed by tone is higher. |
| Speculative Thinking | 3. Another bonus that results from increased wait-time is the appearance of speculative thinking (e.g., "It might be the water," . . ."but it could be too many plants.") and the use of arguments based on evidence. |
| Shift to Student-Student Behaviors | 4. If the wait-time is prolonged an average of five seconds or more, students shift from teacher-centered show-and-tell kinds of behavior to student-student comparing of differences. |
| Student's Questions Increase | 5. As you increase the wait-time, the number of questions students ask and the number of experiments they need to answer the questions multiply. |
| Teacher's Flexibility Increases | 6. . . .By increasing the wait-time, you buy for yourself an opportunity to hear and to think. |
| Teachers Revise Their Expectations of Students | 7. Wait-time can change your expectations about what some students can do. (Before teachers increased their wait-times, students rated as slow or less apt by teachers had to try to answer questions more rapidly than students rated as bright or fast.) |
| Teachers Increase Their Variety of Questions | 8. As wait-time increases, teachers begin to show much more variability in the kinds of questions they ask. Students get more opportunity to respond to thought rather than straight memory questions. |

From: Carin, Arthur A. and Robert B. Sund. *Developing Questioning Techniques: A Self-concept Approach*. Columbus, Ohio: Charles E. Merrill Publishing Company, 1971, p.47.

To summarize, an increase in teacher wait-time sets an atmosphere more conducive to productive questions on higher thinking levels. Students also use the wait-time to organize more complete answers. Some guidelines to assist you in using wait-time more effectively are presented below:

1. Increase your wait-time to 5 seconds or longer if needed.
2. Become aware of how long you wait for particular students to respond after your question has been stated. Consciously focus upon increasing your wait-time for "slow" or shy students.
3. Avoid asking questions at so rapid a rate that you feel compelled to answer them yourself to move things along.
4. Include types of questions which call upon higher cognitive skills than merely rapid-fire memory questions.

Specific Levels of Questions

It has been found through the research which has been conducted in the past 15 years that questions may be classified into levels. These levels have been developed into a hierarchy such that each successive level requires the student to utilize more complex cognitive processes to arrive at an answer. The diagram below shows several of the better known classification schemes.

For our study of questioning levels we will use Bloom's categories of educational objectives to classify questions. A summary of this scheme is given below:

Bloom's Taxonomy	
Cognitive Domain	
<i>Highest</i>	
6. Evaluation:	requires that the student make an assessment of good or not so good, according to some standards.
5. Synthesis:	requires the student to find a solution to a problem through the use of original, creative thinking.
4. Analysis:	requires that the student solve a problem through the systematic examination of facts or information.
3. Application:	requires that the student solve or explain a problem by applying what he/she has learned to other situations and learning tasks.
2. Comprehension:	requires that the student think on a low level such that the knowledge can be reproduced or communicated without a verbatim repetition.
1. Knowledge:	requires that the student recognize or recall information.
<i>Lowest</i>	

From an examination of the above chart, it is evident that memory is the only thought process upon which all other

Levels of Questions

Structured	Open-ended
Simpler cognitive abilities <----->	More complex cognitively
Teacher dominated discussion	Greater student involvement

Bloom: Knowledge--Comprehension--Application--Analysis--Synthesis--Evaluation

Sanders: Memory--Translation--Interpretation--Application--Analysis--Synthesis--Evaluation

Aschner: Memory--Reasoning--Evaluating or Judging--Creative Thinking

Carner: Concrete Abstract Creative

Pate & Bremer: Convergent Divergent

kinds of thinking is based. Robert Gagne emphasizes the need for acquiring broad, generalized knowledge (lower level thinking which is primarily memory) before moving on to higher thinking levels.

While the memory level of thinking is basic to all higher thinking processes, the research shows overwhelmingly that teachers use memory questions in over 70% of their teaching time. It was also found that teachers overemphasize fact questions in their examinations. An analysis of questions used in textbooks also revealed that memory or fact questions are predominantly used here. If we expect students to engage in more creative and stimulating thought processes, we, as teachers, must encourage them by asking higher level questions.

How to Critique Your Questioning Technique

In order to improve your questioning skills, you need to determine what types of questions are presently being asked during a typical lesson. Once present questioning levels have been assessed, goals can then be set for elevating the levels of these questions.

Procedure

1. To assess the types of questions which you ask, a video or audio tape recording of a class needs to be made.
2. As soon as possible after the class is over, watch and/or listen to the recording and choose a ten-minute segment for analysis.
3. Write down in its entirety each question that you ask during this ten-minute segment; i.e., write out every word from the beginning of the question up to the point at which you cease speaking and wait for a response. (A form such as the one below may be used.)
4. As you go over these questions consider the following:
 - a. What effects might your phrasing have had on the student's thinking about the question?
 - b. How could you improve the wording of these questions?

Question Analysis Form (Sample)

In using Bloom's Taxonomy to classify questions, the chart below may be used. Questions should be written on the left-hand margin and then classified according to one of the six categories. If the questions, for example, are creative they should be classified under either the synthesis or evaluation categories. In evaluating your questions you should endeavor, as much as possible, to classify them objectively. You should not use, for example, the synthesis level unless you really think it requires a student to put together information in his/her mind in a form new to him/her.

Questions	Know- ledge	Compre- hension	Appli- cation	Analy- sis	Synthe- sis	Evalua- tion
1. What hypothesis would you make?					x	
2. How would you solve the problem?					x	
3. What inference would you make?					x	
4. What is the name of the capital of Rhode Island?	x					
5. What would happen to the cake if it were cooked 5 minutes longer?			x			
6. What is the most significant scene in Hamlet?				x		
7. How would you find the area of a triangle having two sides that are equal?		x				
Totals	1	1	1	1	3	0

5. Next, focus your attention on the amount and complexity of thinking required for your students to respond (silently or aloud) to each question.
6. Now, classify your questions using the Bloom Taxonomy categories.
 - a. Into which category do most of your questions fall?
 - b. How do your students respond to your questions?
 - c. What were your goals for this class/lesson?
 - d. Is there an alternative pattern of questioning you can think of which would better facilitate the achievement of the goals stated in "c"?
7. Do this type of analysis periodically throughout the year to assess your progress.



Some Thoughts on Questioning

(from Sanders, 1966)

(p. 159)

To put the emphasis on thinking into practice in a classroom, a teacher must present subject matter from sources in addition to the text. He/She must develop a sensitivity to ideas that are useful in instruction and evaluation. Pertinent ideas take such forms as these:

1. A contradiction to information offered in the text.
2. A different interpretation or evaluation than offered in the text.
3. Additional evidence to support a point made in the text.
4. A different line of reasoning to arrive at a conclusion made in the text.
5. A new example of the use of a generalization, value, definition, or skill developed in the text.
6. More recent or accurate information on a topic presented in the text.

(p. 158)

The textbook is weak in that it offers little opportunity for any mental activity except remembering.

(p. 156)

A reasonable rule of thumb for an academic course is that a minimum of one-third of the time allotted to questioning in both instruction and evaluation should be devoted to levels above memory.

(p. 158)

While studying a topic in preparation for instruction, the teacher should be on the lookout for the big working ideas -- the generalizations, values, definitions, and skills that are important enough to deserve emphasis. These are the ideas that best lead to higher level questions.

(p. 157)

...the more knowledge a teacher has, the better chance he/she has to fashion learning on all levels appropriate for his/her students.

Another advantage of scholarship is that it gives a teacher more confidence in subjective evaluation. The teacher who avoids the synthesis and evaluation categories is often the one who has not had enough experience in his/her subject field to be able to give a convincing judgment of the quality of a student's work.

(p. 162)

An important rule in framing questions is that questions designed for grading should reflect the same kind of thinking used in instruction. It is wrong to ask a variety of levels of questions in instruction but revert to the memory category in evaluation. It is equally wrong to conduct instruction on the memory level in order to save higher level questions for an examination. The best way to avoid these errors is to compose examination questions and instructional questions at the same time and make a determined effort to keep them parallel.

Mistakes to Avoid

(p. 169)

As with any idea in education, a special concern for questions poses certain dangers. Teachers who strive for higher level questions may lose interest in the bread-and-butter memory question. They become so intrigued with sending students through intellectual labyrinths that they neglect fundamental knowledge. They may tend to cater to the capacities of superior students. Simple questions designed for slow learners are just as necessary as complex ones in all categories. Subjective questions are important and have a challenge of their own but should be mixed with a liberal number of objective ones. There is satisfaction in giving the one right answer to an objective question and being told the response is correct.

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