

Preparation: A Systematic Approach to Teaching: Some Fundamental Questions to Define the Course Intellectually

INITIAL QUESTIONS

1. **What big questions will my course help students answer (or what answers will it help them to question), or what skills, abilities, or qualities will it help students develop, and how will I help and encourage my students' interest in these questions and abilities?**

Identify the major ("big") question that your teaching might help students to answer.

Identify small, yet still significant, sub-questions, the answers to which will help answer the larger question.

2. **What reasoning abilities must students have or develop to answer these questions?**

List the various abstract reasoning capacities that the student must already possess, or must be helped to develop, to confront the evidence and deal properly with the question and sub-questions.

3. **What paradigms of reality are students likely to bring with them that I will want them to challenge and how can I help them construct that intellectual challenge?**

4. **What information will my students need to answer these questions? How will they obtain that information?**

5. **How will I help students who have difficulty understanding the questions and using evidence and reason to answer them? What questions will I ask them to focus their attention on significant issues, or to clarify concepts, or to highlight assumptions that they are likely to ignore? What writing will I ask them to do that will help them grapple with these matters?**

6. **How will I confront them with conflicting problems (maybe even conflicting claims about the truth) and encourage them to grapple (e. g., collaboratively) with the issues?**

Indicate how you will expose students to more than one possible answer so they will have practice making distinctions.

Indicate how they will learn to understand, apply, and appreciate the criteria the discipline uses to reach its conclusions.

7. **How will I find out what they expect from my teaching? How will I reconcile any differences between my plans and their**

expectations? How will I stimulate students to ask good questions, and how will I create learning that follows their questions?

8. **How will I help students learn to learn, to examine and assess their own learning and thinking, and to read more effectively, analytically, and actively?**

9. **How will I find out how students are learning before assessing them? How will I provide feedback before and separate from any assessment of the students?**

Indicate how you will encourage students to think aloud. Indicate how you will create a non-threatening atmosphere in which they can do so. Indicate how you will give them the opportunity to struggle with their thoughts without facing assessments of their efforts.

10. **How will I communicate with students in a way that will keep them thinking?**

SUMMARY QUESTIONS

11. **How will I create a natural learning environment in which I embed the skills and information I wish to teach in assignments (questions and tasks) students will find fascinating--authentic tasks that will arouse curiosity, challenge students to rethink their assumptions and examine their mental models of reality? How will I create a safe environment in which students can try, fail, receive feedback and try again?**

QUESTIONS ABOUT EVALUATION

12. **How will I spell out explicitly the intellectual and professional standards I will be using in assessing their work and why I use those standards? How will I help students learn to assess their own work using those standards?**

Indicate how you will lead the students to stand back, become conscious of the patterns of thinking and reasoning in which they have engaged, and if possible, connect this experience with experiences they have had in other learning situations.

What Mental Models are your students likely to bring to your course that you will want them to challenge?

What expectation failures will you create about which they will care?

13. **How will I and my students best come to understand the nature and progress of their learning?**

Routine vs Adaptive Expertise

In the 1980's some Japanese theorists proposed that we distinguish between two different types of expertise. These are not levels of expertise, but fundamentally different types.

Routine experts know all of the routines of a discipline, profession, game, or whatever, and, in fact, they may know them so well that they might even be considered world class in their expertise. As John Bransford has written "Routine experts have learned a set of routines that can be very complex and sophisticated, and [they] become very skilled at applying them." They may be life-long learners, but, as Bransford points out, they simply become more "efficient at doing what they have always been doing, and perhaps of adding a few new tricks along the way."

Adaptive Experts, in contrast, also know all of the routines, but they also have the attitude and aptitude to recognize and even relish both the opportunity and necessity for invention. They enjoy exploring the unknown and thinking in different kinds of ways. They appreciate their own knowledge, but they also realize how little they know in comparison to all there is to know. They constantly question their own assumptions, and feel comfortable doing so, and they avoid strong emotional attachments to any set of beliefs.

Question: How do we foster adaptive expertise? The traditional approach has been to think of a single road that passes through routine expertise on its way to adaptive expertise. The learner must go down this road, in this traditional thinking, far enough to encounter adaptive expertise. Thus, we offer the learner a "capstone" experience to foster adaptive expertise only after routine expertise has been achieved. The traditional Ph.D. program is a perfect example of such a single road/capstone experience approach to education. The graduate student is first asked to master the field and take qualifying examinations. After conquering all of the set routines of the discipline, the candidate must suddenly become an adaptive expert, an original thinker who does publishable work in the field for the dissertation. But is the single path model the best approach? Should we think instead about two roads that diverge very early? One leads to adaptive expertise, and the other, no matter how far you go down it, leads only to higher and higher levels of routine expertise. The roads diverge early and the longer one is on the road to routine expertise, the more difficult it becomes to get on the other path.

In that model, the question then becomes, what is the nature of the path to adaptive expertise that makes it special?

What Critical Thinking Abilities?

Here is a list of "critical thinking" reasoning abilities originally developed by Arnold Arons. What would you add or subtract?

1. Consciously raising the questions "What do we know . . . ? How do we know . . . ? Why do we accept or believe . . . ? What is the evidence for . . . ?" when studying some body of material or approaching a problem.
2. Being clearly and explicitly aware of gaps in available information. Recognizing when a conclusion is reached or a decision made in absence of complete information and being able to tolerate the ambiguity and uncertainty. Recognizing when one is taking something on faith without having examined the "How do we know . . . ? Why do we believe . . . ?" questions.
3. Discriminating between observation and inference, between established fact and subsequent conjecture.
4. Recognizing that words are symbols for ideas and not the ideas themselves. Recognizing the necessity of using only words of prior definition, rooted in shared experience, in forming a new definition and in avoiding being misled by technical jargon.
5. Probing for assumption (particularly the implicit, unarticulated assumptions) behind a line of reasoning.
6. Drawing inferences from data, observations, or other evidence and recognizing when firm inferences cannot be drawn. This subsumes a number of processes such as elementary syllogistic reasoning (e.g., dealing with basic propositional "if . . . then" statements), correlational reasoning, recognizing when relevant variables have or have not been controlled.
7. Performing hypothetico-deductive reasoning; that is, given a particular situation, applying relevant knowledge of principles and constraints and visualizing, in the abstract, the plausible outcomes that might result from various changes one can imagine to be imposed on the system.
8. Discriminating between inductive and deductive reasoning; that is, being aware when an argument is being made from the particular to the general or from the general to the particular.
9. Testing one's own line of reasoning and conclusions for internal consistency and thus developing intellectual self-reliance.
10. Developing self-consciousness concerning one's own thinking and reasoning processes.

What's the difference between a deep and surface approach to learning?

[editor's note: The following material on deep, surface, and strategic learning came largely from a Web page developed by the Institute for Interactive Media and Learning, University of Technology Sydney (Australia)]

Deep approach

When students are taking a deep approach they:

- develop understanding and make sense of what they're learning;
- create meaning and make ideas their own.

In their learning strategies they:

- focus on the meaning of what they're learning;
- try to develop their own understanding;
- relate ideas together and make connections with previous experiences;
- ask themselves questions about what they're learning, discuss their ideas with others and enjoy comparing different perspectives;
- are likely to explore the subject beyond the immediate requirements;
- are likely to have positive emotions about learning.

Surface approach

When students are taking a surface approach they:

- aim to reproduce information to meet external (assessment) demands;
- may aim to meet requirements minimally, and appear to be focused on passing the assessment instead of (rather than as well as) learning.

In their learning strategies they:

- focus on pieces of information in an atomistic way, rather than making connections between them and

seeing the structure of what is being learned;

- limit their study to the bare essentials;
- may rote learn information for the purpose of reproducing it;
- are likely to have negative emotions about learning.

A key distinction is that a deep approach involves the intention to understand and create meaning from what is being learned, whereas a surface approach involves an intention to reproduce. Strategies such as memorizing can be part of either a deep approach or a surface approach, depending on the intention.

Why might students be taking a surface approach?

Here are some common reasons (Biggs 1999; Prosser & Trigwell 1999; Ramsden 1992):

- Assessment rewards students for taking a surface approach - eg. exams can be passed through the rote learning of facts or lists of information;
- Students don't receive adequate feedback on their progress;
- The subject is taught in a way which doesn't make clear its overall structure or the connections between topics, so it's harder for students to make these connections;
- The subject doesn't take students' prior knowledge into account, so students are not able to engage meaningfully;
- The subject contains too much content for the time available - lots of topics are covered but there is little time to engage with new material more deeply;
- Teaching is teacher-focused and emphasizes transmission of information;
- Teaching encourages cynicism, anxiety or other negative feelings about the subject;
- Students don't see any intrinsic value in learning the subject and teaching doesn't help them to see the value;

- Students have been successful by using surface approaches in the past;
- Students have multiple other commitments and are trying to do the bare minimum necessary to pass the subject.

Teachers and subject designers can influence these factors to varying degrees. For example, we can discourage cynicism and encourage intrinsic interest by sharing our own passion and enthusiasm for the subject, emphasizing its relevance, devising interesting assessments which help students to make connections between the subject and the 'real world' of work or the profession.

How do you discourage a surface approach?

You can discourage a surface approach by:

- matching the level of the subject and the pace at which it is presented with students' prior knowledge. Because of the uses of surface approaches to learning in previous subjects, many students will not have the expected prior knowledge at the start of a subject;
- ensuring that assessment tasks are aligned with the desired learning response (eg. reduce success for rote recall of theories and facts and the chance for question spotting). If students believe assessments are just machinery for deriving grades, they will jump the hoops and in return they will get their qualifications. A deep approach is excluded;
- keeping the workload to a level that allows students the wider exploration of ideas and the development of interest that characterizes deep approaches to learning;
- matching actual and desired administrative requirements (eg. does the system punish late submission more than it punishes error?).

How do you encourage a deep approach?

You can encourage a deep approach by:

- designing assessment which rewards students for understanding, making connections, etc.;
- encouraging active engagement with learning tasks, eg. students are engaged in inquiry or creative production, explore complex issues, problems or case studies of practice;
- bringing out the structure of the subject explicitly and encouraging students to make connections with (or challenge) what they already know;
- giving students opportunities to discuss, debate and compare their understandings with each other and with the teaching staff;
- giving students opportunities to gain qualitative feedback, especially but not only on their assessed work, rather than just giving marks or grades;
- giving students reasonable opportunities to make reasonable choices about what and how they will learn;
- aligning learning objectives, teaching and learning approaches and assessment to assist students to achieve the learning goals;
- helping students to perceive clear goals and standards for learning;
- designing the subject in a way which matches students' prior knowledge and learning skills and helps students to develop further;
- using student-focused teaching approaches which emphasize changes in student understanding, and help students to become aware of critical differences between their prior understandings about the subject matter and new understandings or ideas which the subject is seeking to develop;
- teaching in ways which encourage students' intrinsic interest - showing your enthusiasm.

How do people learn deeply? A Summary of Ideas

1. People learn deeply by building mental models of reality rather than by "receiving" knowledge "transferred" to them. They use their current models of reality to understand any new things they encounter.
2. People don't store facts away in some bank; they associate things in their brain. If they don't learn to use, they usually can't remember. Learning to remember does not necessarily lead to improved reasoning ability. Simply learning the facts for an examination usually does not mean that those facts will have much sustained and substantial influence on the way people think, act, or feel.
3. People learn to use by trying to solve problems about which they care.
4. Extrinsic motivators to learn decrease interest and diminish the quality of performance. Students who have as their chief goal learning for "its own sake" (who have what the literature calls a Task Orientation) are likely to learn and value sophisticated ways of thinking while student who learn for the sake of recognition from others (an Ego Orientation)—honors, grades, etc.—are more likely to use simple ways of thinking. Students learn best when they feel a strong sense of control over their own education.
5. People tend to learn most effectively if they face sophisticated challenges but little anxiety and have an opportunity to grapple with important questions that reflect the instructor's faith in their abilities, and to do so collaboratively while receiving feedback on their efforts in advance of and separate from any

What major conceptions will students most likely have that you will want them to change?

How will you help and encourage them to change these conceptions?

What expectation failure will you plan for them to challenge their thinking?

What questions will you ask them?

How can you put them in a situation in which their conception will not help them solve a problem or complete a task about which they care?

final judgements about their efforts. They must have the opportunity to improve on their efforts before facing judgments.

6. Learning to reason occurs in fits and starts and benefits from repeated challenges from a variety of levels.
7. Emotions play an enormously powerful role in learning, both in stimulating interest and in distracting students from learning.

Our study of highly successful college teachers found that they strongly believe that people learn best and most deeply when

- They try to answer questions or solve problems they find interesting, intriguing, important, or beautiful;
- They can try, fail, receive feedback, and try again before anyone makes a judgement of their work;
- They can work collaboratively with other learners struggling with the same problems;
- They face repeated challenges to their existing fundamental paradigms;
- They care that their existing paradigms do not work;
- They can get support (emotional, physical, and intellectual) when they need it;
- They feel in control of their own learning, not manipulated;
- They believe that their work will be considered fairly and honestly;
- They believe that their work will matter;
- They believe that intelligence and abilities are expandable, that if they work hard, they will get better at it;
- They believe other people have faith in their ability to learn;
- They believe that they can learn.

And they frame the learning experience for their students accordingly.

The Syllabus as Promises: Can a shift in the Syllabus produce good changes in the course?

Human beings tend to be naturally curious animals who love to learn, but that love of learning can actually decrease with extrinsic motivators that appear to manipulate that learning. In short, we all like to control our own learning. The problem, of course, is that professors usually control the questions that are raised, leaving students with little sense of influence over their own education. The typical syllabus accentuates this problem, emphasizing "requirements" and "assignments" that the professor has devised. Not surprisingly, working under such a syllabus even many good students become strategic learners, learning to follow orders and do what is necessary to make the grade but avoiding deeper learning.

We can begin to reconstruct the environment in which our students learn with a syllabus that makes promises rather than demands and invites students to a deliciously provocative intellectual or artistic feast.

Elements of A Promising Syllabus: A First Step Towards a Promising Curriculum

In addition to the standard information about the professor and TA's (name, contact information, etc.) the syllabus as promises would contain three elements.

I. The Promises:

Example:

What this Course Promises You

In the 1970's and 80's, Former Senator William Proxmire awarded what he called the "Golden Fleece" Award, a sarcastic recognition of what he thought were projects that wasted public funds. Some of the recipients of this dubious honor were scientists whose studies appeared to the senator to be examinations of ridiculously small questions that had no value. Was Senator Proxmire justified in his criticism? What do research scientists do? Why do they sometimes spend years studying extremely small questions? What kind of research takes place at MSU? Is it worthwhile? Some projects funded with public dollars may be ridiculous, while other strange-sounding endeavors may actually have

A story to set up the promises

enormous value. How do you tell the difference?

In this course, you will have an opportunity to explore some of the exciting research being done at MSU on biological clocks. In the process, you will develop considerable insight into the nature of science and the research lives of scientists. You may or may not become a research scientist, but you may some day have to decide about funding for a research endeavor. This course will help you make those decisions wisely. It will also help you understand more about how your own internal clock and the clocks that exist in every animal work. Why do college students often like to stay up late while their parents are "early to bed and early to rise" people? Why do people suffer from jet lag? How do we find out about how Biological Clocks work? How do scientists draw conclusions? How certain are those conclusions?

The promises

II. Ways to Fulfill Those Promises (formerly known as requirements and assignments)

Example:

How Will You Fulfill These Promises?

To realize these promises you must take responsibility for your own learning and participate as an active learner. The best way to learn what scientists do is to spend some time with one. We have arranged for each student to spend at least eight hours with a research scientist at MSU. That person will tutor you in the ways of science, explaining their project to you and helping you understand the process of science. At the end of your experience in the tutoring program, you will write a five page paper about your experience. This paper will help you get more out of the experience and it will help us evaluate your learning, providing you with more accurate feedback. During class lectures, we will provide you with more explicit information on how to write this paper. During class, we will also provide you with lectures on key concepts and information that will also help you learn.

Reading, Writing, and Thinking in the Course

To take charge of your own education, you must be willing to read. We will provide you with some reading material that you will read, analyze, and think

about between each class. We will distribute this material to you electronically [Details about how they will get it]

You will also pursue a topic of special interest to you and write a paper about that topic. The writing of the paper will help you refine your thinking and understanding. If you do not learn to communicate in words, you cannot formulate fully developed thoughts and will, instead, live by the vague impressions and emotions that often substitute for ideas.

By the end of the course, you should be able to {brief list or description of the major learning objectives stated in terms of what the students will be able to do intellectually, physically, or emotionally. It could also include some habits of the heart or mind that students are likely to develop}

III. Ways for the student and teacher to understand the nature and progress of the student's learning (formerly known as "Grading Policy.")

Example One

To evaluate your progress in reaching these goals (and to provide you with feedback on your learning) we will look at the following items.

Example Two

The final grade will assess each student's ability to draw and defend historical conclusions and to think historically. To evaluate your progress in reaching these goals (and to provide you with feedback on your learning), we will look at the following items:

Example Three

We want to help you think about and understand your own learning and thinking so that you can better take charge of that learning. In the course of the semester, we will help develop that understanding of your learning and thinking. At the end of the semester, you should be able to assess your own work and make an argument about where you are in your learning (remember, an argument is not just conclusions but evidence offered in support of conclusions). Here are some guidelines for the self-assessment that will help you make that argument. You should attach the following to the front of your argument:

Purpose: I understand that the purpose of this activity is to assess my own performance across the term. If successful, this report will make it possible for those who read it to grasp explicitly what I have and have not learned this term in the way of thinking abilities. It will itself display critical thinking about my thinking. I will begin by stating the grade which I believe that I have the evidence to support. I will build a case for my grade using the criteria below and excerpts from my own work as support. (Note: Ironically, a well-reasoned case for you to get a low grade may well justify you getting a higher grade, while a poorly-reasoned and weakly-supported case for getting a high grade will certainly guarantee a lower grade. The most impressive response will be an accurate assessment of your strengths and weaknesses leading to the well-substantiated conclusion that you deserve the grade you do in fact deserve.)

Overall Course Goals and Objectives: The goal of the course is to develop thinking abilities and the knowledge and understanding that result from their use in the study of questions and issues.

My areas of strength: I am best at the thinking abilities listed below. In each case, I will attach evidence from my work along with accompanying analysis and commentary.

- 1)
- 2)
- 3)
- 4)

My areas of weakness: I am weakest at the thinking abilities listed below. In each case, I will attach evidence from my work along with accompanying analysis and commentary.

- 1)
- 2)
- 3)

If the course grade is to be based on how well I develop thinking

abilities and the knowledge and understanding that result from their use in the study of questions and issues, my grade should be a

Attached is a summary of the reasoning on which I base my judgment.

What to do on the first day of class

On the first day of class, lay out the course as a series of delightful intellectual rewards in store for those who stay on board. In many disciplines, that means raising the major questions that the course will help students at least to begin to answer; in other classes, it means a discussion of some of the reasoning, artistic, or even physical abilities that the course will help them to develop. In still others, it means both. Some people do all of this with good stories; others with questions they ask their students.

Once you have established that foundation of promises (or opportunities), explain what the students will be doing to achieve that potential—what others might call requirements. Finally, in language and tones that convey a sincere invitation to a feast of accomplishments, simply ask students to join you in pursuit of answers to questions or in the development of abilities.

Conclude with an exercise—an intriguing question or problem—that will give students an opportunity to taste some of what they will be doing and learning in the class. Divide the class into small groups and ask each group to grapple with the issue or problem and then report back. Offer some feedback to their thinking. End with a question that will help them prepare for the next class (perhaps coupled with reading opportunities that will help them begin to answer the question).

Transforming Lectures:

When we studied outstanding lecturers (people who could engage their students and help them learn deeply) as part of the Best Teachers Project, we noticed that their lectures nearly always contained five elements. We say "elements," because while those parts often came in the order we list below, they also came in different orders and sometimes even overlapped one another.

A question or problem. People learn best and most deeply when they are trying to solve problems that they have come to regard as important, beautiful, and/or intriguing. They also love stories,

so good lecturers often tell stories to raise a question or problem.

Help for students in adopting the question or problem as their own.

People learn best and most deeply when they are trying to solve problems that they have come to regard as important, beautiful, and/or intriguing. Good lecturers help students see the significance, beauty, and intrigue of the problem. Sometimes they do that with a good story, or by connecting the question or problem to some larger question or problem.

Engagement of the students in higher order thinking (applying, analyzing, synthesizing, evaluating) about the

question or problem, often using Active Learning activities. People learn best by doing and getting feedback on their efforts; if you want them to learn to think critically, they must have opportunities to do so. Highly effective lectures engage

Many of our professors began their courses with promises rather than expectations, and they gave their students a strong sense of control over their own education. "What you bring to this class is yourself and your desire to participate," Paul Baker would tell his students at Trinity University, "and what you do in here depends finally upon that."

students in thinking critically through the problem or questions; they don't just ask students to remember information or memorize procedures.

Help for students in constructing a tentative answer or solution. When people learn deeply, they construct their own understanding of what something means, how it might be applied, what its implications are, and so forth.

Outstanding lecturers help students construct, apply, analyze, synthesize, and evaluate meaning. They don't just try to pour information in students' ears.

A new question or problem. How do we understand the problem or question now? What's the next question? What problems arise once we solve this one?

While the lectures of outstanding teachers nearly always contained these five elements, many ineffective lectures contained only the fourth element, an answer to a question nobody had raised. Ironically, some outstanding lecturers sometimes leave out the fourth element. They help students understand and buy into a question, engage

them in higher order thinking about the question, and send them off to pursue the question, now understood in a whole new way (thus, a new question).

Delivering the Great Lecture

The five elements shape the great lecture, but effective delivery helps too. How can you deliver the lecture more effectively? Here are some hints we heard from highly effective lecturers:

Have good intentions. When we asked highly effective lecturers what they intended when they lectured, they said they wanted to help students understand, provoke them to think differently, apply their understanding, analyze, synthesize, and evaluate. When we asked not so successful lecturers, they often said they wanted to cover the material. In contrast, great lecturers wanted to uncover the material. At best, less successful lecturers said they wanted to help students remember or “to pick out the key information” they were supposed to remember, but these teachers seldom if ever said they wanted to help students think.

Let good intentions guide everything you do: the eye contact you make with students, the little pauses you use to let key points land, the questions you ask, the rhetorical questions you employ, the clear and provocative explanations you utilize, the posture you assume. Help students begin to build their understanding, but also provoke them to think critically and creatively, and give them some time and space to do so. [While students have the most difficulty with higher order thinking, traditional lecturers, at best, concentrate only on the lower order abilities like remembering].

Treat the lecture as a conversation, even if you are doing most of the talking. How does someone learn from listening to another person offer an explanation? They do so by engaging in a conversation with themselves in which they build new mental models of reality, new connections in their brain. What and how you communicate should promote that sense of a conversation. Look into students’ eyes. Read their reactions and change pace or explanations when appropriate. Engage students in thinking with you. Don’t just “cover” the material. Engage them in

two-way talk. Listen and respond to students.

Recognize that the lecture has some performance qualities. Fill the room with your presence. Make sure everyone can hear you and see any illustrations. Don’t hide behind the podium. Repeat key points. Change pace every ten minutes. Allow time for students to answer and think about the material presented. Entertain by provoking thought, showing a sense of humor, and displaying enthusiasm. Create an inner tension, a sense of anticipation or curiosity. Show your interest in the material and in the students. Show you are interested in what they learn. Try to end with an intellectual bang.

Stop Delivering the Lecture.

Remember, however, the purpose of the lecture is not for you to perform, but for the students to learn. Stop frequently, pose problems, get students to work on them individually, in pairs, in small groups, and then to report back. Listen and respond. Let students respond to one another.

Coverage vs. Discovery: Ten Propositions

- To cover or discover: that is the question.
- Coverage reflects knowledge and skills of the teacher, while discovery represents genuine learning by the student.
- Implicit in the coverage mindset is the notion that knowledge is a “thing”—more than that, a neat, tidy, clever thing with no loose ends, mistakes, or mysteries in it—that can be deposited in the minds of students via lectures. Learning is reduced to storing as much of the “thing” as possible in short-term memory, regurgitating relevant portions of it at exam time, and then dumping it when no longer needed.
- The discovery approach to learning, in contrast, entails the idea that knowledge acquisition is above all an ongoing process with ever changing results, plenty of uncertainties, and real staying power. It happens in the brain of the learner, which is stimulated to search, store, and solve by challenging questions and opportunities to explore these in depth. Making mistakes and correcting them are integral parts of the process.

- Coverage pretends to be comprehensive and “finished.” In fact, it is always arbitrary, selective, and incomplete—an illusory goal and a misrepresentation of genuine learning. Discovery is unique and memorable—the grasping of a principle or connection that can be used and reused without being used up. It can’t be scheduled, but it can be cultivated.
- The “need to cover” is the most common excuse teachers give when they find themselves speeding up the pace of delivery well beyond the capacity of students to keep up. Nothing illustrates better than this the detachment of coverage from learning.
- Discovery can’t be hurried. It is stimulated by questions and curiosity. If bent on “covering the material,” teachers will see student questions as distractions, impediments, or unwelcome detours instead of what they really are—the best opportunities for learning that any class can have.
- Coverage saturates the classroom with routine, regimentation, and predictable tedium. Discovery is unpredictable and varied, unsettling and potentially transformative.
- The motto of coverage—“what I cover, they will learn”—mistakenly assigns agency and responsibility for student learning to the teacher, not the student.
- Let the student remind the teacher, “what you want to cover, I want to uncover and discover for myself!”

Thanks to Professor Douglas Deal, SUNY Oswego

Using Cases

1. Exploratory questions:

- a. What are the primary issues (questions) this material raises? What is its basic argument? What major concepts does it utilize?
- b. What is the significance of these issues (questions)?

2. Testing questions:

What are the possible answers we might consider? Are there any good solutions? What are the possibilities?

What are the implications of accepting this interpretation? What are the problems in doing so?

3. Relational questions:

What solutions (ideas) have we considered; how do we compare and contrast solutions? What criteria do we use in distinguishing between conflicting answers? What concepts will we employ in making such judgments?

4. Priority questions:

Which is the best solution (idea)? Why? What do you reject? Why? What answers do you judge best? Why?

5. Concluding questions:

What have we learned here? What are the implications of our conclusions? What questions remain unanswered? How do we answer these questions?