

TEAK/TA Teaching Workshop



Session 2: Keeping Students Engaged

Dr. Elizabeth DeBartolo, Mechanical Engineering

Dr. Margaret Bailey, Mechanical Engineering

Sarah Cass, RIT Teaching and Learning Center

Session Activities...

- Lecture and questioning techniques
- Objectives:
 - Plan a lecture that keeps your students focused on the class or lab
 - Pose good questions to your class or lab
 - Apply a new technique to a lesson you are developing

Outline

- Lecture and Discussion Starters
- Applying Questioning Techniques and Stories
- Attention span
- Planning activity

Lecture and Discussion Starters

- Tell a story
- Start with a common experience.
- Start with a problem

Advantage of these approaches:

- Helps focus the discussion. Keeps discussion on track.

Starting with Questions

Questions are the most common lecture or discussion opener.

What are/could be some problems with opening with a question?

What do you think is the biggest error in starting with a question?

- Not giving students time to think!
 - Could have students jot notes before asking for answers. This brings out quiet student. (You can call on kids who write a lot in response to your question).
 - Take a drink of water or count to 30 before answering your own question.

Types of Questions

- Question should be meaningful to students and one they can most likely answer.
- Factual Questions
 - Don't make it sound like, "If you don't know the answer, you're stupid!"
- Application and Interpretation Questions
 - Found to produce gains in student comprehension.
 - How does x relate to y ?

Other Types of Questions

- Connective and casual effect questions:
- Comparative questions
- Evaluative
- Critical Questions: Help students become critical readers
 - So and so, an expert in his field, thinks such and such. Under what circumstances could this be true?

Good Questions Gone Bad

- Listen and build on what is said.
- If no one answers,
 - Rephrase the question
 - Break problem down into its parts
 - Clarify problem
 - Identify knowns and unknowns. What's relevant?
 - What are the possible solutions
 - Ask lead-in questions

Learning Theory: Bloom's Taxonomy

There is more than one type of learning. A committee of colleges, led by Benjamin Bloom, identified three domains of educational activities:

- **Cognitive:** mental skills (*Knowledge*)
- **Affective:** growth in feelings or emotional areas (*Attitude*)
- **Psychomotor:** manual or physical skills (*Skills*)

Notes for next time!

- Cut back on the learning theory business
- Add slides on different learning styles, and corresponding ideas for classroom activities that support each.

Cognitive Domain

- The cognitive domain involves knowledge and the development of intellectual skills
- There are six major categories, from the simplest behavior to the most complex
- The categories can be thought of as degrees of difficulties.

Bloom's Cognitive Domain Taxonomy

Level	Categories
1	Knowledge of terminology; specific facts
2	Comprehension Grasping (understanding) the meaning of informational materials
3	Application The use of previously learned information in new and concrete situations to solve problems that have single or best answers.
4	Analysis The breaking down of informational materials into their component parts
5	Syntheses Creatively or divergently applying prior knowledge and skills to produce a new or original whole
6	Evaluation Judging the value of material based on personal values/opinions, resulting in an end product, with a given purpose, without real right or wrong answers.

Guided Questioning Techniques

- Use a variety of question types.
- Teach toward the type of questions you want students to ask.

Technique	
Convergent thinking	Represents analysis and integration of remembered information
Divergent thinking	Brings out interpretation or explanation
Evaluative questions	Deal with values, judgment and choice
Open-ended questions	Encourage involvement
Closed-ended questions	Simple recall

Pay Attention!

- One model for attention span: 3-5 minutes per year of age.
- Doesn't apply to 20-year-olds!
 - Young children: 3-5 minutes/yr of age
 - Maxes out at about 20 minutes
- Stray thoughts can enter your mind every 7-8 seconds.
 - Be more interesting than them so your audience comes back to you!

Helping Class to Focus

- What are some techniques for not losing your class's attention?

Activity: Applying Techniques to Your Lessons

Directions:

- Develop 3 lesson starters to use with your topic.
 - Could be questions, stories, case studies, etc...
 - Don't have to use all – just generate some ideas!
- Develop 3 questions that you could ask during your lesson.
 - Try to address different cognitive levels: some knowledge, some comprehension, some application, etc.



Support for this work was provided by the National Science Foundation's Course, Curriculum, and Laboratory Improvement (CCLI) program under Award No. DUE-0737462. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.