Session 2: Keeping Students Engaged

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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

- Help focus the discussion
- Set expectations
- Create relevance
Your ideas…
Choose Appropriately

- Consider your audience (age, background, knowledge)
- Consider the topic and goals for the class
- Consider the time available
- Does it focus or distract?
- Does it create relevance?
- Does it make information memorable?
Activity: Applying Techniques to Your Lessons

Directions:

• Develop 3 possible lesson starters to use with your topic.
  • Could be questions, stories, case studies, etc…
  • Don’t have to use all – just generate some ideas!
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?
Asking Questions

Questions are the most common way to break up a lecture.

What are/could be some problems with asking questions?
Asking a question: Problems

• People are unwilling to answer (shy, not engaged in the lecture, not sure of their answer)
• Nobody knows the answer
• People answer the wrong 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 theory x relate to problem y?
Other Types of Questions

• Connective and cause and 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
Guided Questioning Techniques

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

<table>
<thead>
<tr>
<th>Technique</th>
<th>Description</th>
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<tbody>
<tr>
<td>Convergent thinking</td>
<td>Represents analysis and integration of remembered information</td>
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<tr>
<td>Divergent thinking</td>
<td>Brings out interpretation or explanation</td>
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<tr>
<td>Evaluative questions</td>
<td>Deal with values, judgment and choice</td>
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<td>Open-ended questions</td>
<td>Encourage involvement</td>
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<tr>
<td>Closed-ended questions</td>
<td>Simple recall</td>
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### Other types of questions: Bloom’s Taxonomy

<table>
<thead>
<tr>
<th>Level</th>
<th>Categories</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Knowledge</td>
<td>When is D-Day?</td>
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<tr>
<td>2</td>
<td>Comprehension</td>
<td>What does “heat treat” mean?</td>
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<tr>
<td>3</td>
<td>Application</td>
<td>Use the 2-d parabolic motion equations to predict how far the catapult will launch the payload.</td>
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<tr>
<td>4</td>
<td>Analysis</td>
<td>Given a set of load and displacement boundary conditions, calculate the stress at the most critical location.</td>
</tr>
<tr>
<td>5</td>
<td>Syntheses</td>
<td>Using what you have learned about sensors and actuators, propose a system design for an active orthotic.</td>
</tr>
<tr>
<td>6</td>
<td>Evaluation</td>
<td>Calculate the deflection of a given beam, including the rationale for using the approach that you chose.</td>
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Typical Class Format

- 5 minute introduction
- 20 minutes new topic
  - Motivation
  - Lecture (with questions)
  - Examples (with questions)
  - Discussion/apply
- 20 minutes new topic
  - Motivation
  - Lecture (with questions)
  - Examples (with questions)
  - Discussion/apply
- 5 minute wrap-up
Activity: Applying Techniques to Your Lessons

Directions:

• Develop 3 questions that you could ask during your lesson.
  • Try to address different cognitive levels: some knowledge, some comprehension, some application, etc.
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