What impact does effective questioning have on student engagement?

Luana Dos Santos & Dr. Luke Conlin,
Dept. of Chemistry & Physics, Salem State University

Intro:
-Teachers struggle to engage students throughout long class periods.
-In groups some students will take the lead on the project and others will occasionally participate.
-Teachers often ask questions to encourage deeper thought and more participation.
-What kinds of questions encourage more student participation? What kinds encourage deeper thought? Which questions do both?

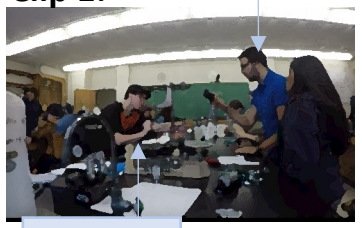
Method:
-Our research group conducted video analysis (Scherr, 2009) of student interactions during a reformed physics lab.
  -We made content logs of video from lab and identified clips of interest for further analysis.
-I selected clips where an instructor's question sparked student discussion.
-The clips were then compared based on the equal participation and depth of their answers.

Instructional Context:
-Third-semester physics class on oscillations and waves
-"Reformed" lab where students designed their own methods for measuring the period of a pendulum.

Background:
Research suggests that these types of questions elicit a better response from students

Knowledge	•Recall data from class
Comprehension	•Understanding
Application	•Apply knowledge to situation
Synthesis	•Combine ideas to get to new meaning
Evaluation	•Make judgment about ideas

Clip 1:



"Go"

starts pendulum

Professor: "How are you deciding when to stop?"

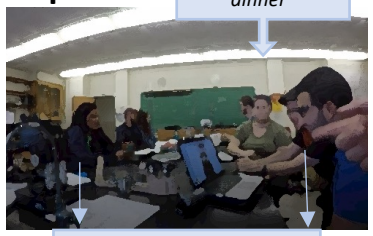
"Yeah" *nods*

"When its dead in the middle" *hand gesture*

"But when we can't see the string crossing the line"

"Because its still moving a bit"

Clip 2:

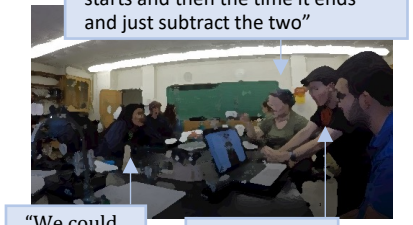


"Talking about dinner"

Small talk about school

Professor: "What's the plan for doing the measurements from the video?"

"When we watch the video, we can watch the time the period starts and then the time it ends and just subtract the two"



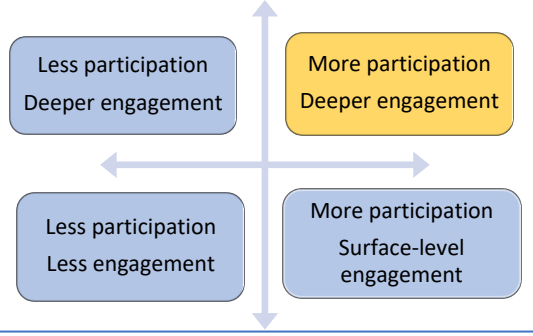
"We could use video editor"

"Markup?" (the video)

Two of the students are helping to set up the experiment while the other two are waiting and watching. 9

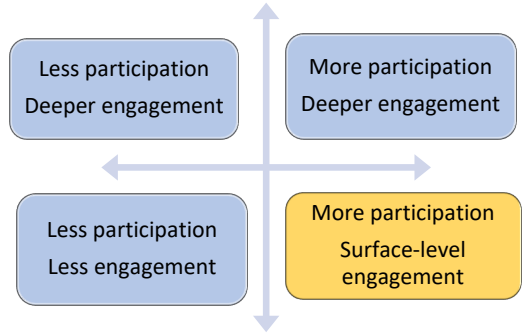
The professor approaches and asks an application question.

All the students take turns explaining their opinion on the question by using previously learned information and applying it to their current situation.



Discussion

- In both clips students were working on data collection, instructor asked application/comprehension question which *increased participation*
- In Clip 1 question led to deeper engagement than in Clip 2
- Hypothesis:
  - Question one required students to pull information from the lecture and apply it to answer the question. *While the second question was simpler and did not require much outside information.*
  - Teachers can engage students through selective questioning, which facilitates improved discussion and learning.



References:

Fries-Gaither, J. Questioning techniques: Research-based strategies for teachers. https://beyondpenguins.ehe.osu.edu/issue/energy-and-the-polar-environment/questioning-techniques-research-based-strategies-for-teachers (accessed Apr 27, 2022).