CPED 6100 | Fall 2017

PHYSICS TALK MOVES

Guiding Group Work

Goal One

Description: Gauge the Group

Physics students often approach problems in a variety of ways. These range from applying previously learned concepts to new topics (such as using kinematics to describe angular motion) to scrambling through equations from a handout to referencing previous problems or in-class examples. It is important to preemptively understand how a group initially attempts to grasp a problem or concept; we can use this information to both allow the group to build upon their own group dynamics and to modulate how we begin to analyze and eventualy facilitate group discussion.

Talk Moves:

"What are the fundamental constituents of this problem?"

"How do we relate the concepts here?"

"How do you interpret the concepts we just discussed?"

"How do your ideas align with your groupmates?"

"What other physical ideas are we accustomed to using?"

"How would you refine or summarize your understanding?"

Goal Two

Description: Help Them Help Each Other

Once a group's preliminary ideas are understood, it is important to facilitate the intermingling of these ideas. Research shows that giving an explanation on a given topic not only adds to group discussion but, more importantly, causes the most understanding and learning for a given student. Equity is important here; each student should either give an explanation of his or her ideas or build upon another student's idea with his or her own interpretation. This allows students to collectively and equitably approach a solution or begin to understand a problem by employing high-level reasoning and problem solving skills.

Talk Moves:

"How did you determine which equations to use?"

"How did you arrive at this answer? Do you think it's correct?"

"What do you think the best way to solve this problem is?"

"What do we already know about the problem?"

"What values are unknown and whatb exactly are we looking for?"

"Can we make an estimate to approximate what our final answer or equation to use will be?"

Goal Three

Description: Facilitate Further Learning

The fundamental concepts of physics appear time and again amongst the expansive curriculum herein; thus, it is important to point out the connections between topics. This helps students to solidify their understanding (or highlight conceptual flaws) of newly introduced material and basal concepts alike. Challenging students to "think outside the box" or further apply their knowledge accentuates group dynamics as well by promoting discussion and equitably solicits ideas.

Talk Moves:

"Can you show me which ideas are at play here?"

"How would you explain this to someone who knew nothing about physics?"

"Are there any other concepts we can use to solve this?"

"Where are these forces in your free body diagram coming from?"

"Why is this different compared to the other problem?"

"How do we arrive at these units?"

Goal Four

Description: Enhance Collective Thinking

Influencing students to give explanations and the resultant conversation in an equitable group promotes learning. Coupling this with equal consideration of ideas creates an excellent learning environment. Physical concepts encompass a wide range of nuances and different epistemological stances; we can help students to "fill out" their conceptual understandings by introducing different pathologies to understand new ideas.

Talk Moves:

"Where do you think we can go next?"

"Can you explain to your groupmates how you got to this step?"

"How does this align with the problem we did in class?"

"Do you understand or agree with the math or equations used here?"

"Do you understand [his or her] idea? How would you explain that in terms of your understanding?"

Goal Five*

Description: Problem Solving Strategies

The large expanse of connected concepts in physics can be hard to align and even more difficult to apply correctly and efficiently when approaching a problem. We can use heuristic pathways such as applying trends or using general similarities to highlight the fundamental concepts within a problem. This can be done by writing out equations or by internally going through a concept map to see the proper path to take when learning a problem.

Talk Moves:

"What about this problem looks similar or different to those you've seen in the past?"

"What are the next steps you would take?"

"Can you think of any laws that we can start from for this problem?"

"How would you relate this concept to what we went over in class?"

"What is the very first thing you would do here?"

This document is an adaptation of "Talk Science: the Nine Talk Moves" in the Inquiry Project.