Education
ED 102
Spring – 2013

Video Assignment

Helen Harlan
Jeremy Shaw

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INITIAL LETTER

Dear Helen,

The video we watched together of you introducing the concept of work to your freshman physics class produced several insights that I would like to discus and share with you; in particular the lesson content/progression, method of topic introduction and student participation.

We discussed that this was the second day of the unit on "work," with this unit directly following the previous unit on "force." As certain subjects, including physics, seem to teach topics in a specific order, typically with the reasoning that a lot of the material is dependent on learning certain topics first I wondered if the order in which the work and force units were taught makes sense. After taking a step back from the curriculum progression and I feel it does seem logical to teach in this order. Work by its definition is stated to be the product of force applied on an object over a distance. To teach the idea of work before force would seem to serve only to confuse students more that they are by the very idea of work itself. Did you find that the progression from the unit on force to the one on work to be an easy transition, or did students find any specific confusion with the change in topics?

I appreciated the method in which you introduced the idea of work, which I believe can work well in other areas of physics as well. The worksheets you had the students complete before the culminating discussion seemed to structure their thoughts and help them come up with specific definitions of what work is. I found it particularly interesting the idea of the "physics definition of work" versus other possible meanings. I believe a key moment in the video is when a student asks straight out, "I don't get what you mean by work!" Seemingly frustrated by trying to understand what it means to represent work in a physics sense. After this response, you targeted the discussion by writing down all meanings of work that students used to determine what pictures represented work. These definitions ranging from having to use muscles, to stating that work is done when force is place upon an object.

By having students define what work is, and narrowing it down to what it means in the world of physics, you seem to have produced a way in which students can differentiate between different meanings and their own misconceptions of the idea. Now that time has passed since your introduction to the topic do you feel that the students have retained this information and that the method of presenting the students with the idea of work has stuck?

It is clear that this lesson engaged most of the students to think about what the idea of work means to them. I feel it can be misconceiving to think that there is little student participation when watching the video because it is clear that there are ideas being thrown out as to their specific definitions of work. By having the students complete the worksheet prior to the discussion it seemed to organize their thoughts and opinions on the topic. So while all of the students may not, have been producing ideas from the discussion I could sense that they were present and participating in the topic. Did it feel this way when teaching the lesson or do you feel this way at all? In watching the video do you feel you see more participation or less from what you originally felt during the class? I am curious what this may look like to an outsider, in particular how their view may reflect the idea of what the "traditional" view of participation in a lesson looks like versus effective discussion in a "louder" classroom. Although I can see that students are participating, I can only imagine what a person who has never seen an urban classroom setting may think.

I believe your video provided plenty to think about and analyze in regards to what can be seen from your students. As I previously stated and elaborated on, the specific areas of the video and lesson that I found interesting and would like to get your further reflections on are the lesson content progression, method of topic introduction and student participation.

Sincerely,

Jerry Shaw

Response Letter

Dear Jerry,

Thank you for your thoughtful response to my video. It is nice to have someone else look and think about one of my lessons. You touched on many things that sparked deeper reflection and that I will be keeping in mind for future lessons. In this letter, I will be responding to your questions on content progression, specifically from forces to work; method of topic introduction; and student participation.

Your first question of, *"Did you find that the progression from the unit on force to the one on work to be an easy transition, or did students find any specific confusion with the change in topics?"* was interesting because I had thought a lot about the progression between forces, work, momentum, and energy in the past, but not specifically between force and work. For some reason, having work follow forces seemed logical. Overall, I felt like the progression went well and will most likely plan it the same way again.

After thinking about it some more, here are a couple of thoughts as to why I think it may have been an easy transition. First, I learned from my students that there are many situations where "force" and "work" are used sort of interchangeably in our everyday language. When I gave my students the activity that had four pictures (see Appendix A - a. person pushing a wall, b. person lifting a box, c. person pushing another person in a rolling chair, d. person holding a bike above his head) and asked them if there was work involved in each of them, I often obtained the response of: "there is force being applied so work is being done" or " the person is putting in muscles into the job so he/she is doing work". I sensed that many students believed that any time there was force (muscles being used to push or pull something), they thought that there was work. So in part the transition from forces to work may have felt natural for my students because the terms are used so similarly in our everyday language. For me, the transition from forces to work also felt effective because the physics definition of work depends

on the physics definition of force. It was helpful to just come from the unit on forces. My students had a grasp on what a 'force' is and were engaged because there was a low barrier to entry. Going back to your question though, I cannot help but feel like switching between different units is very typical of "schooling". I do not think my students really question or stop to think about why the flow of curriculum is the way it is. The curriculum is just something dictated by the teacher, if today is something new, it is something new.

I found it particularly interesting the idea of the "physics definition of work" versus other possible meanings. I believe a key moment in the video is when a student asks straight out, "I don't get what you mean by work!" Seemingly frustrated by trying to understand what it means to represent work in a physics sense. This was one of those moments where students really wanted me just to tell them the answer. They found it frustrating that I was making them do this activity and not having me provide them with specifically what would be "correct". I believe that from all these years of playing school, they have realized that it is easier to just say what the teacher wants to hear and are not used to coming up with and arguing for their own rationales and explanations.

Your comment above also triggered my reflection on what I see as the benefits of the activity, because I think it is a legitimate question to ask if the lesson achieved anything differently than deciding to teach the physics definition of work, or the "correct" answer at the beginning. At the very least, I feel that my students have become more careful and attentive to their word choices. They do not exchange the two words and use them in the correct contexts. Even if they do not remember the exact difference between work and force, they know that there is a specific meaning for work and they have to watch how they use academic language. Recently we have returned to work after a couple weeks of Energy and I find that it is easy to trigger their memory of what work is by pushing down on a table and asking if I am doing work.

In addition to hearing what prior knowledge my students brought, I also saw how they were making sense of what they had been provided with. When I told the classes that only 2 of the 4 pictures depicted a physics sense of work, the majority of the groups in my A and B blocks came up with the explanation that it was when the objects move that there would be work. However, in my E block, the class in the video, each group had came up with an entirely different explanation of what work was and hence chose different groupings of pictures. They showed me what it meant to not be biased by science knowledge. They were truly trying to come up with did. Some chose a specific pair because the object moved in the pictures, but that meant that there were a pair of pictures where the object did not move and the person was putting a lot of effort into pushing an object. Others thought maybe the direction of the push or a pull mattered (2 were horizontal forces and 2 were vertical forces). In some ways, they were doing science by trying to figure out and construct relationships. It was eye-opening to see the different ways they were trying to make sense of the pictures!

Now that time has passed since your introduction to the topic do you feel that the students have retained this information and that the method of presenting the students with the idea of work has stuck? My manager at P&G always said, in any meeting, you should only make 3 points, ideally 2, and you have to repeat each one at least 3 times for the idea to stick. Additionally, I remember in college, every time I relearned something, the easier it became and more I actually internalized. I would say that that lesson in the video was like sowing seeds. The seeds are in the ground, but no roots had formed yet. Since then, we have revisited the topic of work a number of times spread out over a couple of weeks and from these, I have seen roots form. The original seed is still very integral though. It needs to be strong and hardy so that it can grow roots. With the formation of roots, there is quicker recall of the concept. Even the second time around, I was able to cue back to the first lesson by pushing against a wall or table and you can hear all around, "Oh, I remember there was a lesson about that...".

So while all of the students may not, have been producing ideas from the discussion I could sense that they were present and participating in the topic. Did it feel this way when teaching the lesson or do you feel this way at all? In watching the video do you feel you see more participation or less from what you originally felt during the class? As I was teaching the lesson, I felt like the lesson was going pretty well. I think it was a combination of excitement in trying this particular lesson out, hearing a lot of really interesting responses from the students, sensing that students were participating, and feeling successful with how I had time chunked the lesson. The last part was particularly exciting to me because I often have students that fly through all of my questions, but they may not have taken the time to think more deeply about the question being asked, or on the other end where the students have barely started their work. When I walked around, I saw many filled in sheets and lots of conversations.

I will admit that initially watching the video was difficult. My first tendency was to focus on all the movement and commotion in the room. However, the second time around, I saw a lot more. While I do think time chunking helped, I also noticed in the video that certain students still had responses in the first 30 seconds of my asking a question and then started talking about other topics in their groups. The time chunking was really more helpful for me because it a built in time for me to go around and listen to different ideas and engage students. I also saw in the video, that particular students would engage their peers if I had recently been to their tables. So, all in all, the video showed me that the students were productive and were able to think and engage in the activity.

The biggest different I noticed between the video and what I thought had happened was the amount of time I took to have the different groups listen to each other's ideas. I think it was because I had gone around and heard all the different ideas, I unintentionally moved on too fast during the part where the groups shared out what they thought. There could have been more conversation between the groups.

Thanks again Jerry for your letter and questions. They have definitely made me reflect and analyze this class to a greater extent. I look forward to discussing one of your lessons!

Sincerely,

Helen

Appendix A: Class Handouts, Work lesson activity

A: Pushing a wall 	**B: Lifting a box** 
C: Pushing a chair across the floor 	**D: Holding a bicycle over your head for 10 minutes** 

A: Pushing a wall 1. Do you think this is an example of work? Why? 2. Does your team think this is an example of work? Why or why not? What are the different arguments?	**B:** 1. Do you think this is an example of work? Why? 2. Does your team think this is an example of work? Why or why not? What are the different arguments?
C: 1. Do you think this is an example of work? Why? 2. Does your team think this is an example of work? Why or why not? What are the different arguments?	**D:** 1. Do you think this is an example of work? Why? 2. Does your team think this is an example of work? Why or why not? What are the different arguments?