

Appendix F: Review of PV Panels Labs

These kits were used for the first year of a two IB physics class. This is a college-credit physics course that covers certain topics the first year, and certain ones the second. This class also has specific lab requirements, which the kits helped meet, as I will discuss. The kits were used primarily as a follow-up/ reinforcement/ application of an electrical circuits unit. I would like to use these kits as supplements to a unit on alternative energy as well, which another teacher at our school did in her Environmental Science class.

Series and Parallel Connections:

The first thing we did with the kits was the series-parallel lab. This helped refresh/reinforce the circuits content we had been covering. This also showed a good, practical application of the circuit knowledge. Thirdly, this gave the students experience with the kits, which was important for what came next. The lab instructions were a little long, and I did wind up condensing this lab to make it more digestible by my students. Another benefit to my altered version is that all the data and questions are answered on a sheet separate from the instructions. This allows me to save lots of paper by only making one class set of instructions and individual data sheets. One thing that this does require, however, is a thorough pre-lab explanation on the part of the teacher, as well as a good explanation of the purpose of the lab.

Inquiry Activities:

This class has a particular requirement where students are to run their own "inquiry" investigations. These are full-blown labs where the students must pick some phenomenon to investigate, and then design, carry out, and analyze the data from the experiment. The kits lent themselves to this type of project very well. Between the filters, the fans, the resistors, the area of a cell shaded, the distance of a light from the panel and the brightness of the small light bulbs, there was a variety of phenomenon that the students could pick to investigate. Each student had to come up with their own variation, which usually looked at the relationship between one of the items listed above, and the power, current or voltage in the circuit. Some examples included looking at how the wavelength of light on the panel affected the rate at which the fans spin (measured with a Vernier photogate) or how a different light bulb in the lamp affected the current put out by the cell. These kits really provided a great forum for the students to do some real inquiry-based learning. The students came up with their own versions of almost all the labs.

I should note that while this project was theoretically specific to the IB physics class, it doesn't need to be. There is a big push to get more inquiry-type labs in the classroom,

and this would be good for any physics class. One caution about this type of lab is that it requires a high level of independence on the part of the students. As a teacher I had to make sure the students were all fairly comfortable with a certain amount of independent work, and were able to use the kits well. The kits worked fine in this regard, however, as this unit came towards the end of the year, and the students were well trained in lab behavior and expectations by then.

General Thoughts

Another really great use for these would be having all the students look at the wavelength dependence of the voltage. As the IB physics class is a two year course, I will likely use them for this purpose next year. The topic of power load is also covered in a unit called Energy, Power and climate change, and I will likely use the kits for that purpose as well.

There are quite a few options for what labs could be done with these kits. As far a curriculum support, I feel that a teacher should really only pick two or three of these to do, as any one lab setup can get overwhelming of done for an extended period of time. Also, it is important that a teacher be familiar with how the labs will support the content they wish to teach, and are able to run the labs appropriately.

I will certainly use these kits again next year, and will talk to the freshman physical science teachers about using them in their curriculum as well.