Power to the People

Power. That which must be obeyed, the Scheme of Work, allows me just one lesson for my A2 Mechanics group on this. I scratch my head.

"How was I taught about power at school?" I wonder. Twenty-five years after leaving the place, I am sometimes shocked as to how my teaching is still subliminally affected by what happened there.

"What would my old teachers have done?" A bit of lucid exposition, a couple of examples, and a few exercises. But then all those years ago, we were a group with virtually identical prior learning experiences, all studying exactly the same subjects, and with remarkably uniform skills in terms of passing exams. I sigh. As an inheritance for a maths teacher, my own history of learning the subject is both a blessing and a curse. I cast my eye down the list of students I currently teach. One has scraped an E at AS, one has passed with a grade A at a canter. Most do Physics, but not all, and certainly the range of subjects studied and the methods for their study are wider than in my day. How would my students learn best about power? Some might go for the exposition-examples-exercise package that I had taken on board so happily when in their shoes, but there are freer spirits before me now that might find that a bit of a turn-off. I could dive in with some board stuff, but that would be bored stuff for the high-fliers, and potentially mysterious to the non-physicists. I need a Rich Starting Point.

What could my RSP accomplish? It would allow my weaker ones to get going, at their own speed, while allowing the stronger ones to take the basic idea and extend it into the blue yonder. It could free me up to help the ones for whom 'power' will be a fresh idea with pertinent theory at the start, until they could in turn free me up to supply pointers for the likely A graders. Then eventually some exposition, legitimated now by the need to collect good practice inspired by the RSP, and to codify a little what we might have learnt. And then consolidation, allowing practice to make perfect.

"Okay, folks, Power. Let's start with a car. Driving on the flat, with speed v, which can vary. The engine exerts a force F, which can vary, and operates at a power P, which can also vary. The challenge is to draw three graphs for each of the following situations.

Graph One: v against time.
Graph Two: F against time.
Graph Three: P against time.

Oh, and the initial speed is 5m/s, and there is a constant resistance force on the car of R newtons. And I'm not saying all of these situations are possible!"

"Situation One: v is constant."

"Situation Two: F is constant while v is steadily increasing."

"Situation Three: P is constant while v is steadily increasing."

"Situation Four: $P = pt + 5R$, where p is constant and t is time."

"Situation Five: $P = p \ln (t+1) + 5R$, where p is constant and t is time."

"Situation Six: $F = pt + R$, where p is constant and t is time."

"And Situation Seven - make up your own!"

Situations One and Two kept everyone happy, while my stronger students agreed together that my sheet could be improved. In Situation Four P should be increased by a constant 5k, and the same can be said of Situation Five. I was glad to be corrected. We had the time to collect together our thoughts, the exposition now motivated well for everybody, and then turn to more conventional questions on power.

I would be lying if I said that my RSP accomplished exactly what I wanted it to. My teaching always seems messier in reality than in the planning. Maybe it turned into an exercise in logic rather than one that really got the idea of power across. The weaker ones were perhaps lost in the harder situations, the stronger students did still experience moments of boredom. But the lesson did fizz, most of the time.

Some say that the size of current syllabi at A Level doesn't allow much time for this kind of activity. I say that if the RSPs are carefully chosen, the benefits in better understanding could save us time in the long run. I'm moving from a model at A Level that has all too often been:

1/2 exposition (key activity), 1/2 exercises,

to a model of:

1/3 RSPs (key activity), 1/3 exposition, 1/3 exercises.

It's working for me so far.

Jonny Griffiths, Paston College, 2003

www.jonny-griffiths.net