Sample pretest questions given to K-8 preservice teachers



“A little more than half of the [pre-service] students answer correctly, with a large fraction of the students stating that the heavier block will cause a greater change in the water level.”



“Approximately a third answer correctly. The largest group of students give answers in which the larger pieces have larger densities.”

Discussion

“After the pretests, students complete several in-class activities on mass, volume, and density. Students perform an activity that is essentially identical to the water displacement question in Fig. 1….After seeing a demonstration and observing the water displaced by two metal bars of the same volume but different mass, approximately 100% of the students answer the water displacement question correctly.”

“That is reassuring, but the demonstration is essentially the same physical situation as the pretest and posttest. The activity on density is not as closely related to the pretest question in Fig. 2. Students measure mass and volume for several objects constructed from a set of plastic cubes and measure masses and volumes for various samples of the same liquid, finding in each case that the ratio is very similar for samples of a given material. Shortly after completing these activities, approximately 80% of students answer the density question in Fig. 2 correctly.”

**Implications for today’s Workshop - Dave**

Students benefit from hands-on experience in which naïve conceptions can be challenged and deconstructed. It is significant that the experiences be selectively guided to develop a robust content understanding. Do not attempt to teach by ‘repairing misconceptions’, but rather by building concept understanding . The same concepts explored in scaffolded contexts develop a rich understanding and increase the likelihood these concepts will be seen to ‘exist’ outside the science classroom walls.

Caution: do not attempt to focus on a multitude of concepts with one activity as this can overwhelm and confuse the learner. That is why my inquiry lab sheets have gradually reduced to a single page.