

## SCED 204 Sample Learning Commentary

### SCED 204: Matter and Energy in Chemical Systems

An idea that is agreed upon in the scientific community is that “temperature measures the average kinetic energy of small particles.” A misconception that I had at the beginning of Chapter 1 Activity 2 is that the phase of matter determines the speed of the particle. In my initial ideas I drew a solid, a liquid, and a gas that were all at the same temperature moving at different speeds. I showed that the solid was moving slowest and that the gas was moving quickest, most likely because it is hard to picture the tiny particles in solids moving since solids do not usually move by themselves.

In my workbook, I explained that when dropping a hot stone into a bucket of cold water, the water began to heat up, so the particles began moving faster. I also said that as the rock cooled down its particles began to move slower, until they are the same temperature. While this is a true statement, the change in speeds of the particles was not due to any change in the phase of matter, but the change in the energy that the particles had. We then did a series of experiments, in which we watched food coloring spread throughout two petri dishes, one full of hot water and one full of cold water. We saw that it took less time for the particles to spread in the hot water and less time in the cold water. I did not understand this compared to my original explanation of the speed of particles, but thought that maybe since the hot water was closer to evaporating, the particles were moving faster than in the cold water. I answered a question asking what temperature measures and said “The speed at which the particles that make something up are moving because hotter molecules move faster and cooler particles move slower.” While it is true that within the same substance particles will move at different speed according to heat, it is not the heat that causes that speed, but the kinetic energy in the particle.

I finally had my moment of understanding when we connected our ideas about temperature to energy diagrams. When we talked about what was happening in the liquids on a small particle level, I realized that they were experiencing contact interactions in which one particle was giving and one was receiving kinetic energy through a mechanical transfer of energy. In the narrative I described how it was because of this interaction that one particle slowed down and the other sped up realizing that the temperature was a measurement of kinetic energy. This showed me that my initial idea that objects at the same temperature in different phases were all moving at different speeds was wrong, because their temperature is what measures kinetic energy so they have to all be moving at the same speed.