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2017

(Wooden) Mystery Science Block Activity

Background:
This activity was developed based on a "nature of science" activity for high school students that I found from the Minneapolis Museum of Science website around 2004. I believe the museum created this activity based on an activity that was published by the Biological Sciences Curriculum Study in a publication on how to teach the "nature of science" before a unit on evolution. I greatly modified the activity to be engaging for an adult audience.

I created wooden blocks (2" x 2" x 2") and placed numbers and letters on the corners of 5 sides. The fifth side I covered with colored paper. For the monastic students, I created the cubes out of graph paper (that I cut before traveling and taped at the monastery) and left the 6th side blank.

I created three versions of the blocks to increase the chances that students sitting next to one another have similar but slightly different blocks. This makes the activity more engaging.

Directions:

1. Each student or pair of students should be given a block
2. Ask students to determine what should be written on the 6th side of the block that is blank
3. Do not tell them anything else. Some will write things down, others will work alone, others will talk to one another.
4. Once students start raising their hands indicating that they think they know the answer, ask them to compare their answers with other pairs near them. Hopefully, some groups will have slightly different versions of the blocks.
5. Ask students to try to convince one another of their solution and to listen carefully before accepting any claims.
6. As a class dissect each step in the process to solve the problem. Students will forget an important step: we make assumptions about our observations. In the case of the cube activity, we assume that the alphabet is sequenced A through Z and that the digits are sequenced from 1 onwards. This seems intuitive with this activity, but when we engage in scientific research, different teams of scientists may make different assumptions when they start their studies.
7. See the list below.
8. At the end, tell the class that it does not really matter what the "answer" is because it is not known. That is what drives scientists to engage in the process—looking for truth. We never truly find it, nor do we prove anything. We merely dismiss what we know is not "true" and what we "disprove." Hence, scientific investigation is driven by the quest for truth using a methodical process. It is NOT A METHOD (that sounds like a cookbook recipe). Rather, it is a PROCESS that others in the same sub-discipline can repeat and follow. [maybe just semantics, but this is something that becomes important later on when students start comparing the processes/methods used in diverse fields: paleontology, modeling, molecular biology research, etc.]

PROCESS FOR SOLVING THE PROBLEM (What's on the 6th side of the block?):

1. Make observations
2. Documented data in science notebook
3. Identify assumptions (sequence of letters and numbers and relationships between the two). Ask, "what do I already know?"
4. Look for patterns
5. Develop hypotheses about patterns
6. Test each hypothesis by moving the cube to different sides (or examining other cubes)
7. Evaluate hypothesis
8. Potentially revise hypothesis and develop alternative hypothesis
9. Return to steps 6-8 (potentially doing so multiple times)
10. Engage in peer review and persuasive argumentation
11. Disseminate new knowledge (by sharing with the class, often using written documentation)