Making Sense of SCIENCE

Phenomena-Based Learning

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Phenomena-based instruction is instruction where learners make sense of intriguing phenomena using related science facts, concepts, and practices. As learners gain new information and skills, they are asked to apply them to the phenomenon. In this way, new information has immediate value to learners. They gain a deeper understanding of the information and internalize its meaning, rather than having knowledge that remains superficial.

In this way, learners work much like scientists and engineers. They aren't waiting for a teacher to provide answers. Rather, students are actively seeking solutions, designing investigations, explaining what they want to explain, and asking new questions of their own. This approach requires the belief that learners are active knowledge builders and problem solvers.

Shifting toward phenomena-based learning

At first glance, shifting toward phenomena-based learning seems like a lot of work. In some ways, of course, it is — any time you change anything about your teaching, there are a complex series of ramifications, some of which you can't foresee. Many teachers have made, or are starting to make, this shift. Some teachers have found that the following process for shifting toward phenomena-based learning is not especially painful, and makes teaching fun.

❶ Select an interesting phenomenon.

Brainstorm phenomena that can be explained (or partially explained) by your students when they obtain their grade-appropriate learning targets. The ideal phenomenon is interesting to you (for your own learning and for your understanding of where students need to go) and interesting to all your students. Not every individual phenomenon is going to be ideal — perhaps even none of the phenomena you investigate over the course of a year will be ideal in this way. That's okay. Think about the phenomena as a set. Don't get hung up on picking the perfect phenomenon for each activity or topic. If you select a phenomenon that is weak (for you or your students), pick the next one with that limitation in mind.

❷ Analyze the utility of your existing lessons.

Ask yourself what students learn from these activities and how that learning applies to this phenomenon. If there are key aspects of a phenomenon that you don't have activities for, either look for a new activity students can do, or choose a method to help you deliver the needed content, such as a video, slide presentation, lecture, reading assignment, or outside expert. Not everything has to be learned via collaborative hands-on investigations.

❸ Plan a sequence of activities.

Start by observing the phenomenon and having some exploratory discourse that allows students to try on ideas and ask questions. Tell them they are going to participate in a series of learning activities that build toward them being able to make sense of this phenomenon. Encourage students to make a list of things they want to learn about that might help them make sense of this phenomenon. Engage students in your planned learning activities and add on a wrap-up step where they apply their learning from that activity to making sense of the phenomenon. For example, ask them, "Which of the things that we learned from this activity apply to our goal of making sense of XXX phenomenon? How so? What new questions do you have about our phenomenon? What else do you want to learn about that you expect might help you make sense of this phenomenon?"

❹ Make a plan for how you will know students have made sense of the phenomenon.

Will they make a poster, write an explanation, make an oral presentation, design a slide show, or do something else to show their understanding and apply the scientific concepts they have learned?

One final comment — phenomena-based learning is not an all-or-nothing game. All the things students need to learn do not need to fit into a phenomena-based learning sequence. Begin by switching up one unit and see what happens. By the time you finish, neither you nor your students will be in the same place with phenomena-based learning. You can then make another choice about what to do to further develop phenomena-based learning in your classroom. Maybe you'll keep the phenomena-based unit for next year (most likely with some tweaks). Maybe you'll find the shift was easy and productive and you'll shift another unit. And maybe you'll find another phenomenon that engages students and puts them in the driver's seat for their own learning.