

Stewards of a Vernal Pool

by Beth Kraft

Local ecosystems make the best life-science labs. I have known this since my own childhood explorations into the woods and ponds near my home. I have since watched the invaluable learning that takes place when children spend time freely exploring the natural world around them, seeking answers to their own questions, exploring, and discovering, while at the same time developing new questions to be answered yet another day.

As a fifth-grade teacher, I was aware of how valuable it would be for my students to have this kind of experience as part of their science learning. After considering the idea for a while, I realized that a seasonal pond (vernal pool) near the school where I teach would make the perfect “natural classroom.” I applied for several grants to get financial support for such a project, and within a few months I had \$3,500 in grant money, an outline for studying the pool, and the excitement and enthusiasm to get it started. My participation in the Institute for Inquiry Learning Group provided the peer support that was so helpful during this time.

Working at the vernal pool



I approached the project in an inquiry-based way. I began by introducing several “starting point” activities in the classroom so my students could begin exploring the distinct properties of water. As they worked, the children became familiar with the process skills needed to do scientific investigations: observing, questioning, predicting, recording data, and communicating. I encouraged questioning by setting up a “Water” question board in the classroom. After each investigation, students would reflect in their journals and then share their findings with the class. During this time, students were asked to think of questions they might still have about their investigations. At any time, they could ask questions and/or write their questions down on index cards. All questions were read aloud and then posted on the question board.

After many of these water investigations, we narrowed our questions down to the best investigable questions. Students selected the question that interested them most, and then got together with peers who were interested in the same question. With their partners, they designed tests, wrote up materials lists, investigated, created ways of recording information, shared what they discovered and, through the process of their own investigations, came up with more questions to be investigated. This was the approach we took throughout our year-long study of the vernal pool. It served as a model of how to do our investigations.

Learning at our “outdoor lab”

When my students began studying the vernal pool, their first investigation was guided only by this open-ended direction: “Learn all you can about the vernal pool.”

Students began by getting the tools and materials they needed, such as turkey basters, tubs, nets, and magnifying glasses. Each child also had a clipboard for recording information. From this initial investigation, questions about the pool's ecosystem began to emerge.

The pool became our outdoor lab. We never went without a purpose or an inquiry to investigate. Each trip (which lasted between one and one-and-a-half hours) encouraged more questions and more inquiry investigations. We kept an ongoing "Vernal Pool" question board in the classroom.

Since the pool is seasonal, it fills with the winter rains between December and May. The rest of the year, from June until December, it's just a dry indentation in the ground. Although we made few trips out to the pool during this dry period, we did go out in November to learn about the native plant life with a docent from the California Native Plant Society. I wanted the students to see the area before it filled with water so they could better appreciate the natural changes that occurred when it became a viable pool.

I was amazed at how quickly the project took flight. My vision became theirs, moving from a teacher-initiated project to a student-generated/student-guided project with me as facilitator. My students' enthusiasm and motivation propelled a naturally spiraling process. They asked questions that led to research and investigation. This process generated more questions, which created more enthusiasm and more investigation. By mid-February, the project was in motion and fueled by the students' energy and inquiries.

Back to the classroom

I found that many of the questions initiated outside the classroom could be answered through in-class investigations. At one point, for instance, the students became fascinated by how small insects known as water striders, or caddis flies, could walk across the pool's surface. This generated questions around the concept of surface tension. As a result, I found many

ways for my students to explore and develop their own understanding of the mysteries around the concept of surface tension in the classroom.

Our vernal-pool studies also took us to unexpected places outside the classroom. For example, we took several field trips to local water-treatment and sewage plants. These experiences stimulated questions around water purification. Once again, I was able to help students understand the issues of the seriousness of water pollution and the difficult task of purifying water by doing a variety of investigations in the classroom.

In the classroom, we talked about what was needed to sustain life in the vernal pool and then created a microcosm of the pool within a 10-gallon glass tank. We collected pond water, algae, a variety of aquatic plant life and insects, egg sacs, and the tadpoles of frogs, toads, and California newts. Students took turns observing the in-class pool and reporting observations and changes to members of the class.

This student-made environment was also important in stimulating observation and investigation. For example, one group watching the tank noticed a caddis fly burrowing into a newt egg sac and eating the developing embryos. Of course, this disturbed the class, and they began to wonder why this was happening, especially since they had assumed that aquatic insects were

*The pool became
our outdoor lab.*

*Observation and data
collection*



not meat eaters. One hypothesis was that the food source for these insects was so scarce in our artificial environment that the caddis flies were being forced to become carnivores in order to survive. Another possibility, of course, was that these aquatic insects really were carnivores. Suddenly, we had a new investigation to pursue. The class decided that the best way to find out was to go out to the pool and observe these insects in their natural environment, which is exactly what we did.

The project in retrospect

Because of the enormity of the vernal pool project and my commitments to the grants, it was important for me to continually examine the skills and curricular content I needed to teach in fifth grade, and ways in which to integrate these into our pool investigations. It easily fell into place.

I am convinced that watershed studies

can be a perfect thematic umbrella. In order for my students to follow the process we designed for pool investigations, they had to use skills from many curricular areas. In addition to science process skills, they learned research skills, communication skills, reading and writing, presentation design and public speaking skills, as well as math skills when measuring things like rate of flow and changes in the pool's depth. We also made many connections to events in United States history and to waterways.

By the end of the year, my students had become stewards of this local vernal pool habitat. They understood human impact on an ecosystem, both positive and negative, and the meaning of interdependency, the important role each living thing has in maintaining balance in a delicate environment. They learned the importance of being aware, active citizens and advocates for the preservation of their local habitats. ✍

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