

HARNESSING OUTDOOR EXHIBITS FOR TEACHERS AND STUDENTS

Modesto Tamez
Exploratorium Teacher Institute
Sebastian Martin
Exhibit Developer

The Exploratorium's cavernous indoor space has inspired and educated several generations of visitors since it opened in 1969. We have found volume and darkness to be integral and defining attributes of our institution. Now, for the first time, we have taken the Exploratorium outside, into the light of the wider world. Frank Oppenheimer, the Exploratorium's founder, wanted average citizens to be aware of the subtleties of their surroundings and hoped that the experience of the Exploratorium would extend beyond the building's walls. The creation of the Outdoor Exploratorium at San Francisco's Fort Mason is our first large-scale attempt to go take phenomenon-based science learning outside, to where people work and live.

The primary function of the Exploratorium Teacher Institute is to teach middle- and high-school teachers that actually *doing* science is better than simply *talking* science. Institute educators were extremely excited about the opportunity to work with the Outdoor team as they refined and built exhibits. Specifically, we've been working with the team's exhibit developers to find ways in which classroom teachers could see the value of having students discover that science is everywhere—and that they could create exhibits for exploring natural phenomena themselves, in their own schools and classrooms.

There were many firsts in this collaboration. Beyond leaving the museum's familiar workshop and exhibit floor (Fort Mason's exhibits are about a kilometer away from the Exploratorium), this project represented the first opportunity for teachers play a role in the development of an exhibit collection from the project's inception. As part of this role, we had the ability—and the responsibility—to give ongoing feedback to the exhibit developers. In addition, we created several Saturday teacher workshops to experiment with ways of using outdoor exhibits to teach about natural phenomena.

One of our main goals was to have teachers try out outdoor exhibit prototypes and give feedback from an educator's perspective, but another was to come up with "snack" versions of the activities. Science Snacks are smaller versions of our floor exhibits that can be transported to schools, so that students from around the area can use them to build knowledge and inquiry skills without having to make the journey to the museum. We helped the developers design these activities to maximize students' ability to see their own outdoor worlds in fresh new ways.

For example, one of the first exhibits we worked with the team on was *Lift*, an array of light airfoils suspended on a series of vertical cables. We found that when the wind was strong, our teachers expected to see all the airfoils rise uniformly, forming a straight horizontal line. To their surprise, the foils rose at different rates and held at different heights, giving a tangible indication that winds speeds may vary considerably over even short distances. To test out Snack versions of this experience, we gave about 30 teachers meter sticks with light plastic ribbons attached to one end. The teachers stood at different locations in a field, and on the count of three, they raised their sticks aloft—and immediately noticed that even though they stood close to each other, the directions and heights of their ribbons were markedly different. Quick, rough, and playful experimentation like this helped us create versions of the exhibit that could be easily duplicated at many schools and classrooms with a minimum of time and materials.

Our collaboration with the Outdoor team made it possible for us to create Snack versions of many of the final exhibits installed at Fort Mason, and thus to enhance teachers' abilities to bring both specific content ideas and more general inquiry skills to their students. And to our great delight, many of the teachers who participated in our Outdoor workshops have since written to tell us that not only have they tried many of those Snacks in their own classrooms, they have also been inspired to search for other phenomena that they and their students could observe and discuss. This is perhaps the most fundamental lesson of all: Getting teachers and students to play with ideas and experiment with phenomena develops its own momentum—and creates new and unforeseen opportunities for learning.