



SERIOUS FUN AT THE OUTDOOR SCIENCE LAB

Children's Center staffers Jason Mytar and Monica Wood, and two potential Nobelists in the outdoor lab.



It's not rocket science, but it may lead to rocket scientists. Catering to three- to five-year-olds, the Children's Center at Caltech's Outdoor Science Laboratory was dedicated on May 12. The Children's Center is Caltech's daycare facility, and the lab is the brainchild of director Susan Wood, who came to Caltech from UCLA six years ago and brought a science-based curriculum with her. To the kids, however, the curriculum is hard to distinguish from fun. At that age, "inquiry-based, hands-on educational opportunities," as they tend to be called in the ed biz, consist of such things as a trek across campus to Millikan Pond to see the turtles, which on a recent day the Koalas—the three-year-olds—were doing.

The Koalas were in the midst of a unit called "Dead or Alive," in which their assignment was to figure out how to decide if something is living or nonliving. Observations and hypotheses are noted in their journals, which is to say the budding investigators draw pictures and dictate one-on-one to a grown-up who writes down the words. Sample entries:

"Jason [Mitar], you are alive because you have eyes."

"The strawberry is alive because it is green."

"Q: [to Jason] Are these *Curious George* monkeys? A: Yes. The monkeys are not living because they are in a picture."

"Monkeys. Not living because I don't like monkeys."

Every child gets a turn to speak in the discussion sessions that follow, says Wood—"We teach the value of collaboration"—and the group's collected wisdom is distilled into posters. It's an open-ended conversation, she adds. "I don't want it to be a quiz show—'What color is my blouse?' 'Blue!' 'That's right!'" Another day's discussion might focus on toys with moving parts, or machines in general—if something moves by itself, does that mean it's living? "We will carry this through several months. Kids learn through repetition."

Another experiment involves comparing natural loofahs to the rectangular sponges you get in four-packs. "Water play is very big in the summer, and it gives us the chance to introduce exotic words like 'saturated' into the discussions," says Wood. "We don't expect them to retain every word they hear, but they pick up a lot. We're learning as we go that they are more capable than we expected, and we had very high expectations."

It's Tool Time! Jason Mytar hands out the protective gear as Children's Center director Susan Wood (background, at left) and Anne Chandler, science curriculum coordinator, look on from the shade of the lab.



The four-year-old Raccoons, meanwhile, are learning about energy by estimating how far a paper airplane will go, throwing it, and measuring the result. Another day they'll be putting a thermometer in a shaft of sunlight to see what happens. Their workroom has quantitative tools of all kinds—measuring cups, rulers, a kitchen scale.

The Beavers, age five, have moved on to the six simple machines—the wheel and axle, the wedge, the lever, the inclined plane, the screw, and the pulley. The underlying lessons are about form and function, and about tools in general. The Beavers' journals are full of drawings of machines seen around campus: a telescoping construction crane (pulleys), the ubiquitous electric carts (wheels), a cherry picker trimming tree branches (levers), and even a washing machine full of clothes (gears).

Each day offers a host of activities, including a class on drawing from life. This teaches close observation—really *looking* at things, which is of course the basis of science. Today the Beavers are doing watercolors of a pot of lilies in bloom. A snippet of overheard conversation between the teacher and a student: "What are you going to draw first, the stem

or the flower?" "The stem." "Where is the stem?" "This is the stem." Says Wood, "She's making them aware of the details, but she's not telling them what to draw. There's a big difference between this and doing crafts." Mapmaking is big, too. Explains Wood, "A map, like this one of our trip to Millikan Pond, is like a story. It has a beginning, a middle, and an end. It's a lot like reading, and it's a very good activity for our pre-readers."

The Children's Center occupies four 1920s vintage bungalows, two on either side of Chester Avenue on the northern border of campus. The Koalas, Raccoons, and Beavers live in the two houses on the west side of the street. The Outdoor Science Laboratory is nestled between the Beaver house and the Koala/Raccoon house. It is largely shielded from the street by the houses, and has no wall on the yard side "to help facilitate the exploration of nature." Under a rakishly slanted corrugated-steel roof, the central, U-shaped work island has a built-in light table, whiteboards that flip over to reveal overhead mirrors for better views of things on the counters, and portable electrical power from a pair of overhead cable reels. There are even mi-

croscopes for looking at bugs and leaves. The walls are lined with cabinets, sinks, and another whiteboard. Construction cost about \$200,000, half of which was financed by five years of fund-raisers; the balance came from a grant from the Howard Hughes Medical Institute arranged by Stephen Mayo (PhD '87), the Bren Professor of Biology and Chemistry, whose sons were a Koala and a Beaver last year.

M)Arch. (yes, that's their preferred spelling) of Santa Monica designed the project. The firm was chosen because of their highly collaborative approach—they worked with Wood, the CCC staff, and the CCC board "for many months before the pencil hit the paper," says Wood. The industrial look was chosen, she adds, because it "tells the kids that what we are doing is real, and it's important. And a lot of them have seen labs, so the architects and I went into several labs and took pictures before they began designing." This is in keeping with the center's philosophy. For example, in the make-believe kitchens "the tea sets are all real china—we want to give them as many real things as possible. The message is, we trust them. These things are delicate, and they know that." The outdoor lab stocks

tools—real ones, including saws with sharp teeth that really cut. Similarly, the clay-modeling supplies include sculpting tools from an art-supply house instead of the typical assortment of repurposed kitchenware. "Good tools are just easier to use."

The lab won gold in the Spark Design Awards' Architecture and Interiors category. The awards, given annually by Pasadena's Art Center College of Design, are in seven categories ranging from mobility to architecture. The finalists were culled from hundreds of entries worldwide. (Other honorees included a design for a Dutch rental-bike dispenser and an ergonomic chair made from sustainable bamboo.) Juror Robert Hale, a principal at the Rios Clementi Hale Studios, called the lab "minimal intervention in architecture that achieved maximum results."

The fully accredited Children's Center at Caltech is a private, nonprofit organization that offers childcare to the Caltech/JPL community; it is also open to children from the surrounding area.

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