A Different Kind of January Getaway

Engineering outreach in the Alaskan bush

by Peter Dunn
October 24, 2012

When the temperature reached -52 in Alaska, the travelers had to wait to fly to their next stop. They included (from left) ASRA workshop veterans Kieran O’Neil, Anastasia Brease, and Sara Falcone ’15, plus Sara’s father, Joe Falcone ’77.

Early in her freshman year, Sara Falcone ’15 told her advisor, Ed Moriarty ’76, that she wanted to use engineering to improve living standards in the
Alaskan bush, the remote areas of her home state not connected by roads.

Moriarty, a technical instructor at MIT’s Edgerton Center, conducts educational outreach efforts in those parts. He replied, “If you’re thinking about working in the bush, you should spend some time there when the weather’s not nice.”

A few months later, in January 2012, they were off on an excursion that took Falcone, Moriarty, and Falcone’s mathematician father, Joseph Falcone ’77, on a weeklong circuit of Anchorage and the remote towns of Takotna and McGrath. At each stop they engaged groups of primary- and secondary-school students with playful, collaborative engineering-oriented projects. The voyagers also fulfilled the not-nice-weather requirement: temperatures of -52 °F left them “weathered in.”

Falcone, now a sophomore majoring in mechanical engineering, first experienced life in the bush at 14, when
she spent a month at an isolated fishing camp. “There were only about 40 people, no cell phones, no plumbing,” she recalls. “In many places in Alaska, the outside world seems so foreign; it’s pretty rough out there, and I felt I’d like to do something to help.”

In high school, Falcone deepened her interest in the rural Alaskan lifestyle when she took Moriarty’s engineering workshop at the Alaska Summer Research Academy (ASRA), a two-week program run by Jeff Drake ’75 at the University of Alaska Fairbanks. Drake, Moriarty’s former MIT roommate, also went on the January trip and arranged trip funding from the New York Life Foundation.
“That ASRA workshop was the first time I ever created anything,” recalls Falcone. “I’d dreamed of designs, for new kinds of cabins and better ways of doing things, but never built anything. Electricity was completely foreign to me, but Ed just said, ‘It’s easy—wire these up,’ and walked away. Ed doesn’t instruct you at all, but he ends up helping you more than you’ll ever know. It was life-changing. I definitely wouldn’t be at MIT if it weren’t for meeting him.”

Moriarty brought that hands-on approach on the road in January. “Ed brought suitcases of stuff from his lab — little physics toys, things that make you think,” says Falcone. “The first day, he had us unpacking and saw a kid who didn’t seem interested. He said, ‘Hey, let’s assemble this wind tunnel and put a miniature snow machine inside.’”

As smoke passing through the tunnel illustrated the way air travels around a moving snow machine, “that shy kid
who didn’t want to be in school was fascinated,” Falcone says. “Soon there was a group watching. When the kids saw how fast the air moves over the windshield, they said, ‘That makes total sense! When I put my head up over the windshield I get frostbite!’”

One popular project was a small wood-and-plastic assembly housing red, green, and blue LEDs, which introduces students to soldering and assembling electronics into a working system. The completed light source lets them experiment with diffraction and other physical phenomena, but it also creates beautiful, glowing patterns, reminiscent of the northern lights—
and this simple beauty is central to the educational process.

“All humans respond to art,” notes Moriarty, who likes to speak of STEAM education (for science, technology, engineering, art, and mathematics) rather than STEM. “The goal is to get kids engaged with passion and joy. You don’t start with the rigor. Rigor is your friend when you’re trying to do something really well, but it’s not the way to introduce the subject—it’s like introducing music with scales.”

Moriarty’s programs in the bush, at the Edgerton Center, and across the country reflect an engineering learning model in which empowerment is more important than content. “You make things, you work in teams, you fail and learn to do better the next time,” he explains.

Back at MIT, Falcone connected several students from the January trip to the Media Lab and other Institute resources. She assisted at an ASRA program in Fairbanks last July, but
most of her summer was spent working at a company that designs mechanical systems for inexpensive prebuilt, energy-efficient houses for Alaska’s North Slope. “It’s pretty interesting,” she says. Now she’s considering adding an architecture major to her engineering studies to boost her design skills.

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