When you think of the amazing creatures of Antarctica, an insect probably does not come to mind. But this unlikely animal, and a scientific expedition to Antarctica, was the foundation for a learning event that created a community of learners spanning kindergarten through sixth grade and extended beyond the classroom.

Dr. Lee’s laboratory studies the survival mechanisms of *Belgica antarctica*, a wingless midge found only in Antarctica. This midge, though modest in appearance, is naturally appealing to children because of its extreme lifestyle. It is the southernmost free-living insect in the world and the largest land animal in Antarctica. (Seals, penguins, and other birds are marine animals.) *Belgica* can also survive the harsh Antarctic winters by freezing nearly solid or by resisting freezing by losing more than 40% of its body water (Elnitsky et al. 2008).
Miami University’s Antarctic expeditions typically include a K–12 teacher who participates fully in the research and brings Antarctica home to one or more classrooms in the United States. Because of logistical challenges associated with the early 2010 expedition, a science writer filled the role of expedition educator instead of a classroom teacher. By teaming up with classroom teachers, we were able to connect a local school to the expedition. In this article, we share some of our successes—and the snags we encountered along the way—to give you pointers to develop a similar program.

Frozen Fly Blog
Before the research team traveled to Antarctica, we gave presentations to the entire school in two assemblies (K–2 and 3–6). We introduced the expedition and briefly touched on science concepts such as seasons, food webs, and life cycles. During the assembly there were frequent pauses to allow students to ask questions, such as how cold it would be in Antarctica and what kind of food the team would eat. More importantly, the assemblies created a connection with “The Scientist,” an expedition member who would be communicating with the students for several weeks via her “Frozen Fly Blog” (see Internet Resources).

Team members shared their Antarctic experience via the Edublogs site. Because we were addressing multiple grade levels, we focused on the nature of science and the connection between students and the global environment. For example, we created a series of videos of scientists at Palmer Station discussing why it is important to study and protect Antarctica (see NSTA Connection). Our most involved video touched on how Antarctica helps shape global climate, how environmentally friendly actions at home can help Antarctic wildlife, and how Antarctica is owned by no nation and therefore “belongs” to everyone.

Most days during the five-week expedition, blog posts were read aloud to the entire school during morning announcements. Photos and videos of Antarctic wildlife, station life, and research activities were simultaneously shown on an internal feed in each classroom and later posted around the school. Periodically, a classroom teacher

<table>
<thead>
<tr>
<th>Grade</th>
<th>Project Description</th>
<th>Science Standard</th>
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</thead>
<tbody>
<tr>
<td>K</td>
<td>Cut paper murals of penguins in their habitat</td>
<td>Plants and animals have basic needs and life processes</td>
</tr>
<tr>
<td>1</td>
<td>Watercolor and crayon paintings of Antarctic whales</td>
<td>Animals have life needs and specific physical characteristics that can be classified</td>
</tr>
<tr>
<td>2</td>
<td>Ceramic sculptures of Arctic or Antarctic animals, placed in dioramalike landscapes</td>
<td>Living things are interdependent with their living and nonliving surroundings</td>
</tr>
<tr>
<td>3</td>
<td>Drawing of an architectural structure that meets the environmental challenge of Antarctica</td>
<td>Behavioral and physical adaptations allow animals to meet their life needs</td>
</tr>
<tr>
<td>4</td>
<td>Book comparing and contrasting the Arctic and the Antarctic</td>
<td>Planning and conducting an investigation</td>
</tr>
<tr>
<td>5</td>
<td>Three-dimensional paintings of ocean life in Antarctica</td>
<td>Characteristics of the ocean environment</td>
</tr>
<tr>
<td>6</td>
<td>Collage mural, inspired by Jackson Pollock and John Bigger, that depicts Palmer Station and the importance of studying Antarctica</td>
<td>Public policy decisions affect the environment</td>
</tr>
</tbody>
</table>
would submit student-generated questions to the blog for the Antarctic team to answer. Question topics included the kinds of whales near Antarctica, what penguins are like, and what life is like at Palmer Station.

The Art of Integration

It became apparent early on that fitting Antarctica into the normal school day would be a challenge. Our school, like so many others, is focused on science education standards and preparation for high-stakes testing that tend to elevate math and reading over science. There is little time in the day for “supplemental” curriculum, despite the recognized value of special science events for elementary students (NSTA Board of Directors 2002). To maximize the enrichment opportunity, the administration decided that art classes would be the primary vehicle for the Antarctic science content. Under the direction of the art teacher, every art class completed a project connected to state science education standards and national art education standards (Figure 1, p. 33). We spent an hour per week on the projects.

Standards-based science lessons kicked off the art lessons and reinforced science content as the students created their projects. For example, second-grade students are required to learn about three habitats: wetlands, forests, and deserts. Students learned that although Antarctica may not be covered in sand, it is the world’s largest and driest desert. The art teachers and classroom teachers either taught the science lessons as a team or worked together ahead of time. Students received grades for their art projects based on effort, project achievement, and content knowledge (see NSTA Connection for a sample assessment rubric).

Extending the “Antarctic Classroom”

We posted lesson plans, content from the blog, links to other appropriate websites, and games—all focused on Antarctica—on the school’s internal Blackboard classroom. Every student and teacher was enrolled in the electronic classroom. The teachers used the materials to supplement their science lessons and allowed students to explore the classroom during free computer time.

The school alerted parents to the activities and resources through monthly newsletters. Parents had access to the content on Blackboard through their children’s accounts. To encourage a learning environment outside of school, some of the lesson plans and digital slide shows included information targeted to adults. Parents then had the opportunity to read to their children at home and to discuss complex information, effectively extending the school curriculum.

After the Expedition

The culminating event was a special Antarctic Night, celebrated in conjunction with a Parent Teacher Association meeting that featured a pot-
DIY Learning Opportunities

Although your school may not get the opportunity to interact with scientists traveling to Antarctica, you can replicate many of the successful elements of our program.

Work With a Scientist
Scientists can bring content knowledge, enthusiasm for their chosen vocation, and career advice to the classroom. Furthermore, working with an outside scientist creates the sense that science education is a community effort, not just something that occurs at school. We serendipitously connected before the Antarctic expedition, but you can find your own scientist–educator through local government labs, museums, and universities (see Internet Resources for examples).

Continual Interaction
Your guidance can help better connect the scientist with your classroom—whether he or she has a little or a lot of experience translating research into materials for elementary students. As our learning event progressed, the Antarctic team received feedback on what did and did not work with students. Immediate evaluations of student needs and interests allowed us to change course with the blog a few times. The interaction also motivated the creation of the videos.

Multiple Media
You can catch the attention of students and hold it by providing multiple opportunities to engage with the scientists, providing a variety of media with engaging visuals, and allowing students to guide the content through their questions. The immediacy of the social networking environment in our project enhanced the students’ connections to learning, and modeled responsible use of the internet. The use of the morning announcements as a live news show got the entire school involved. The experience also simulated television, a media format both familiar and appealing to children.

Cut Across the Curriculum
Students learned that there is more than one way to conduct a scientific investigation. The integration of art and science also helped support learners with limited English skills, visually oriented learners, and learners less successful in math and science. Last, the art projects were a tangible product that could be shared with other grade levels, parents, and younger siblings during the family science night.

Host Family Science Night
Make it easy for parents to attend. The culminating event promoted student/parent interactions with the science and art content without unduly interfering with family time at night, or requiring that parents arrange for child care. You could further enhance a learning event like this by:

- Offering an orientation prior to the science unit, to help parents feel more comfortable with Blackboard and the electronic classroom.
- Opening the school library in the evening to better connect families without access to a computer or the internet at home.
- Using social media (e.g., Twitter) to alert parents to new course content.
- Creating a curriculum that could be shared through Blackboard with other schools.

luck dinner to maximize attendance. We advertised the event through the school district’s press office, follow-up phone calls by the school’s news liaison, and a schoolwide phone blast by the principal. Close to 100 parents and children attended, making it the school’s biggest family event of the year.

The evening featured multiple components:

- A short presentation and Q&A session for parents about Antarctica and the importance of science education.
- Preserved samples of larval and adult Belgica for parents and children to examine. Because the larvae are only a few millimeters long, we also brought a 2-foot-long model of a larva to give children a better sense of Belgica’s appearance.
- Hands-on science demonstrations, facilitated by teachers, about ocean currents and Antarctic animals. We also encouraged students to plant seeds and take them home, to reinforce the idea of thinking globally but acting locally.
- Computers in the library with access to the blog, the Blackboard classroom, and other appropriate websites about Antarctica. Classroom teachers were available to answer content-based questions.
- Displays of the art projects about Antarctic, by grade, and interactive educational displays tied to the students’ artwork. For example, students were asked to answer math problems relating their height to that of a life-size model of an Emperor penguin.
The interactive science component also incorporated student-generated science displays.

- A scavenger hunt about Antarctica, in which students and their parents received prizes for answering science questions hidden around the school.

“Can We Do It Again?”

The students were palpably excited by the contact with a real, live scientist, and the continued reinforcement of the lessons through the news show. Teachers reported that students were highly engaged in the activities and that morning announcements encouraged class discussion. Students continually asked questions about Antarctica and how the team was doing and speculated on answers to questions posed during the news show.

One of the most popular components of Antarctic night was the scavenger hunt. The children were totally engaged, combing the school to find answers. Parents were equally thrilled with the evening event. One parent tearfully exclaimed that her child had been in three different local schools, but had never encountered an opportunity similar to this experience. Another parent commented on the unique opportunity to interact with a scientist. Several parents reported they frequently heard about Antarctica from their children.

There were obstacles to providing this unique long-distance learning environment to students; however, the results more than justified the effort. The students are still excited about Antarctica and eager for more interactive opportunities, and their parents have demonstrated the importance of science education by getting involved in this special event. More than a year after the first student assemblies, students were still asking questions about Antarctica, and hoping to do a similar program again!

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Internet Resources: Antarctica

Studying Belgica at the Bottom of the World
http://frozenfly.edublogs.org/

Internet Resources: Find a Scientist

Bringing Physics Presentations to Your Students
http://ed.fnal.gov/trc_new/demos/

Find A Scientist
www.sciencechicago.com/content/find-a-scientist

Laboratory for Ecophysiological Cryobiology
www.units.muohio.edu/cryolab/

Scientist in a Classroom
www.bio.davidson.edu/programs/outreach/siac.html

References
