

THE ANTARCTICA PROJECT:

LEARNING MIDDLE-SCHOOL MATHEMATICS THROUGH APPLICATIONS

Antarctica, like all units developed by the Middle-School Mathematics through Applications Project (MMAP), is based on new thinking about mathematical applications.

Traditionally, applications were something that came at the end of the chapter, in the form of a few of those dreaded word problems, where students practiced the algorithm they'd just learned to do. That is not the kind of application you will find herein. Instead, each application is a "slice" of the real world that has potential for engaging young people in mathematics, rather than a list of mathematical skills to be learned. Students work within a scenario with a problem that encourages them to create and analyze designs. These scenarios provide plenty of opportunities for mathematics to be used and learned along the way.

How do students better learn math through this kind of application? Real-world scenarios provide both reasons and resources for learning mathematics. The *resources* are the real-world designs students are making. They can constantly check out their mathematical insights in terms of their design and their knowledge about the world. For example, in *Antarctica*, as students learn about scale, they can constantly refer back to the research station they are designing to see whether their mathematical learning about scale makes sense in their design. The *reason* for learning mathematics comes from students' intense engagement in the design process. Middle schoolers find project-based units compelling; such units appeal to both their senses of play and their imagination about their adult futures. For example, in *Antarctica*, students imagine themselves as architects who design a fully-functioning research station for scientists. This is a playful scenario based on real-world adult work

involving CAD systems—technology that architects use for layout and design.

What does this learning process look like in the classroom? In *Antarctica*, as students assume the role of architects, each student plays a role in a group, and each group in the class-wide activity. As students work through the activities, mathematical problems emerge, and it becomes *functionally* necessary to learn and do the math to solve the real-world problems encountered throughout the unit. Students use a variety of processes—research, collaboration, peer review—and a variety of tools—computers, rulers, Concept Close-Ups—to complete each stage of the project with new mathematical understanding.

How do these units prepare students for future study and work? MMAP is committed to preparing a diverse population for the 21st century through exceeding national math standards and through integrating technology in the mathematical classroom. The curriculum materials and software in *Antarctica* make math accessible, exciting, and successful for middle school students. Through working on the complex real-world problems in the unit, middle schoolers find more enthusiasm for math—which can, in turn, carry over into future study, particularly for girls and students of color who traditionally have been under-represented in mathematical and technological fields. This unit also gives students the resources—particularly technology—to think mathematically in finding solutions to everyday problems. Applications work helps students see how math can function in their daily lives, now and in the future, and prepares them to use it successfully.