

PACIFIC MATHEMATICS AND SCIENCE

Island Educators Work Together to Improve Classroom Instruction

By Paul Dumas and Pam Legdesog

In late 1992, federal funding through the Pacific Mathematics and Science Eisenhower Regional Consortium provided an opportunity to rethink education in mathematics and science in Hawai'i and the U.S.-affiliated Pacific. Mathematics and science educators from all over this region came together for the first time to collectively design a vision for mathematics and science education. At that meeting, 22 individuals from diverse cultures and very different educational contexts sat somewhat anxiously looking at each other and wondering what they were in for.

This group, the Pacific Mathematics and Science Leadership team, included faculty from the Curriculum Research & Development Group (CRDG) at the University of Hawai'i at Mānoa, Consortium staff from PREL, and a representative from the Education Office of the Federated States of Micronesia (FSM, which consists of Chuuk, Kosrae, Pohnpei, and Yap). Expertise at the classroom level was provided by mathematics and science specialists from American Samoa, the Commonwealth of the Northern Mariana Islands (CNMI), FSM, Guam, Hawai'i, the Republic of the Marshall Islands (RMI), and the Republic of Palau.

For PREL, it was a big step into new territory: from the world of research and development into the world of technical assistance and professional development. This was not an easy transition. The early months involved discussions with mathematics and science specialists to develop a scope of work that would meet both funding requirements and the needs of schools in the Pacific. These conversations were sometimes difficult, but they enabled the Consortium to grow into an effective program – one that supported teaching and learning and was closely linked to regional education priorities, while meeting the unique needs of different constituents.

At the same time, the group of specialists evolved into a regional team that continues to help set the program's direction. As a team member from RMI says: "Participating on the team has had a positive impact on my individual development and enabled me to work more effectively with teachers. As a team, we have become more knowledgeable and confident, emerging as leaders among colleagues. Perhaps most importantly, student achievement is rising in the schools we work with most closely."

Looking back over the years, it is possible to identify critical events that enabled this transition to occur. They include:

- recognizing similarities among diversity,
- developing shared beliefs about mathematics and science education,
- access to professional development,
- accepting responsibility for improvement,
- being empowered to design these efforts, and
- having access to at least some of the resources needed to implement these plans.

The individuals on the Leadership Team wrestled with the

role of mathematics and science education for nearly a year. Was science as important to a 5th grade girl in Yap as to her counterpart in Honolulu? Should students in Guam, American Samoa, and Kosrae all take algebra in high school? How should the daily experiences of a young person on an outer island in Chuuk fit into a standards-based education? What about the medicinal use of plants in Pohnpei, the importance of family and community in CNMI, and the unique marine environment in Palau? Were there features that should be common to classrooms anywhere in the region?



Photo: Kavita Rao

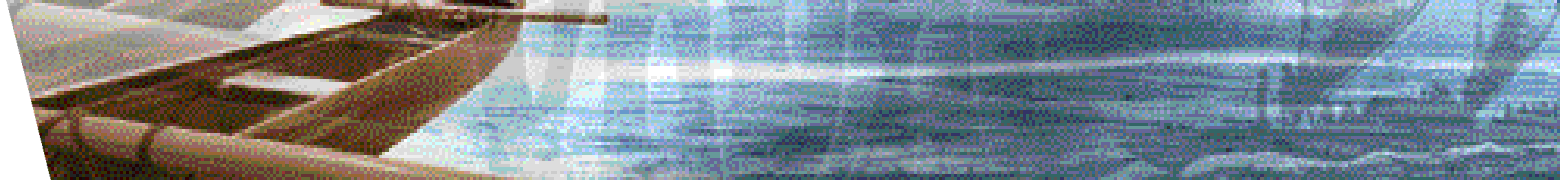
► Professional development is a major priority for the Pacific Mathematics and Science Leadership Team.

Vision

The first outcome of the group's struggle with these questions was the development of a shared vision (see sidebar) recognizing values that Islanders held in common while acknowledging the uniqueness of each island community. The development of the Pacific Standards for Excellence in Mathematics and the Pacific Standards for Excellence in Science (available at www.pacificconsortium.org/rsc/sf.asp) followed shortly after. The Pacific Standards helped inform the development of standards and benchmarks from Hawai'i to Palau, but in the end, the process was more important than the product. The conversations that occurred increased every participant's understanding of subject content and of teaching and learning.

The team also came to realize that bringing together mathematics and science and the processes and knowledge of their cultures would improve classroom instruction. This realization led to the development of culturally relevant curriculum materials like the Pathfinder Teaching and Learning Units (www.prel.org/products/ms_/pathfinder/pathfinder.htm).

Finally, and perhaps most importantly, team members recognized that there were more similarities than differences in mathematics and science education across the region, and that



many improvements could be best accomplished through regional collaboration. They recognized that they had both individual and collective voices, and could use both to help shape mathematics and science education in the Pacific. In the years that followed, team members presented jointly at regional and national conferences, developed shared products like Pathfinders and visited each other's communities to provide professional development.

Teamwork

But ensuring Pacific children the opportunity to become scientifically and mathematically literate – knowledgeable, capable, and caring – requires much more than identifying a vision and standards. The Leadership Team realized that bringing their vision to life would require rethinking roles and developing new skills.

The first step in this process was expanding the team concept to include Consortium staff at both PREL and CRDG and removing distinctions based on roles and affiliation. This bigger team identified their collective professional development as a priority. Each team meeting since then has had this focus, although the content of the professional development has changed over time as the work progresses. Topics included assessment, science and mathematics content knowledge, and documenting progress. The most recent meeting, in November 2003, focused on the use of computer-based tools such as iMovie to document impact and inform next steps.

Team members have also taken advantage of opportunities to meet individual needs by participating in distance learning degree programs, enrolling in university courses, and attending institutes in Hawai'i and the continental U.S. Five team members have participated in PREL's Pacific Educator in Residence (PEIR) program. (For more information about the PEIR program, go to www.prel.org/aboutprel/PEIR.asp.) The PEIR program provides opportunities to spend a year at PREL pursuing professional development and working on projects to improve education in the home community. In July 2003, mathematics specialists on the Leadership Team were

recognized as Pacific Island Scholars at the International Psychology of Mathematics Education Conference and invited to share their knowledge of mathematics teaching and learning in the Pacific educational context with leading educators from around the world.

Planning

Having defined important mathematics and science in the Pacific and improved their skills, the Leadership Team worked with individuals and organizations in each island community to develop plans to improve mathematics and science education. These plans include curriculum development, designing professional development for remote island schools, using the Internet to enhance instruction, and building fish ponds to investigate aspects of the marine environment. All include a commitment to improved teaching and learning. With support from their departments and ministries of education and the Pacific Consortium, the Leadership Team accepted responsibility for bringing about improvement.

The Pacific Mathematics and Science Leadership Team continues to meet

once a year. The team is now a visionary group, advocating educational reform in home communities and across the region. Their deep knowledge of the needs and realities of their home islands, their understanding of effective teaching and learning, and the skills they have acquired as professional developers have strengthened and empowered them to promote improvement across the region.

Ms. Ginny Fenenigog, a Math Specialist from Yap who has been with the team since its inception, states: "I think having set our vision and standards early on has enabled us to define and focus our efforts . . . Documenting and determining the impact of our work is challenging. But I think the best way we can determine whether our team efforts have been successful is to look for improvement in the teaching and learning of mathematics and science in our classrooms. Then we'll know whether our work over the years has made a change for the good."

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Our Vision for Mathematics and Science Education Across the Pacific

By the Pacific Mathematics and Science Leadership Team

In our vision for Pacific mathematics and science education:

Pacific children are literate in mathematics and science. They are effective leaders capable of solving their own problems in a changing world, and are competitive, competent, and caring members of a global community.

Teachers are confident in their knowledge. They act as leaders and informed decision makers, promoters of cultures, positive motivators in the classroom, and supporters and caring linkers of students, families, and communities.

Teaching is student centered and inquiry based, enabling students to build on their prior knowledge to develop understanding and capabilities. Teaching takes place in classrooms and other places that are learning centers both in reality and in attitude, that have adequate resources, and that are inclusive of all students, homes, and communities.

Pacific cultures are valued and incorporated into the education of our students.

Education leaders, including the Pacific Mathematics and Science Leadership Team, are knowledgeable, caring, and capable lifelong learners who continually develop new connections and understandings and are able to collaborate and learn from one another.