

Minds-on Activities Support New Standards for Science Learning at Monterey Peninsula Unified School District

When Seaside High school students first came to Seaside State Beach to monitor sand crab populations and document the local environment, they used mechanical techniques and data collection tools consisting of pencil, paper and pH test strips.

Now, thanks to a grant written by former Biology Chair Pam Miller and biology teacher Julie Haws, students are using technology tools--Palm handhelds with Bluetooth wireless technology and the ImagiProbe Wireless Sensing System from PASCO scientific--to create a field and lab environment that enables them to collect and analyze scientific data in context.

"We had the challenge of revitalizing Seaside High's science program," said Pam Miller. "We wanted a digital system that could be used to perform experiments both in the lab and classroom."

Miller and Haws wanted students to have more minds-on field experiences and classroom labs that would reach across all grade levels and all the sciences the school offered. They felt it was beneficial to provide a modern platform on which students can learn skills that they can build on year after year.

To acquire the technology they needed, Miller and Haws wrote a grant titled "Students as Scientists," with the goal to have students gain authentic scientific field experience, and work with real field data commensurate with a true scientific community. The proposal was submitted to the National Oceanic & Atmospheric Administration (NOAA) Monterey Bay Watershed Education and Training (B-WET) Program and later awarded. The B-WET program was designed to provide finances to environmentally based education organizations and present them with meaningful outdoor experiences. The grant provided enough money to purchase the Palm handhelds and the ImagiProbe System complete with PASPORT sensors to measure temperature, pH and stream flow. They also plan to use probes to measure oxygen levels and air pressure. The grant also provided funding for transportation costs to field locations, substitute teachers, teacher training and administrative costs.

"The digital sensors have so many benefits when linked wirelessly through Bluetooth to the handheld; it is cutting edge education technology," said Miller. "It enables students to work in small groups and still perform individual tasks. One student may hold the sensor and examine the measurement context while another collects data or watches the live data transfer. It fulfills our need for a digital platform in both the field and classroom." The technology also enables students to aggregate datasets by uploading their data into a database. By combining their data they can develop a more comprehensive understanding of the total project.

“Digital technology enables students to instantly review, reflect on and interpret data,” said Julie Haws. “Having a digital science platform enhances the learning experience. As teachers we can encourage students to reflect on their data, encourage them to reconsider it by reviewing it over and over from different perspectives. This technique changes the way students draw conclusions. Students live in a technology-driven society. They relate to this type of learning,”

With technology in hand, students now have an updated method of documenting the local sand crab population and their environment for the sand crab database. This study is part of a federal program called Long Term Monitoring and Experimental Training for Students (LiMPETS). LiMPETS is managed by NOAA and includes schools from Washington, Oregon and California. Over 200 Seaside High biology and environmental studies students have made the journey to Seaside State beach this year to monitor the sand crab population. Because so many species rely on sand crabs, their environment is often a key factor in determining the health of the ecosystem. By measuring environmental factors students can graph data and draw their own conclusions about the health of the sand crab environment.

“The students take pride in executing real scientific experiments,” said Haws. “They respect the technology and pick up the knowledge and skills faster than I could have ever imagined.”

“They are showing stronger interest in science and are enjoying the process more than we could have hoped for,” adds Miller. “The technology coupled with hands-on teaching methods has given them the opportunity to learn how to collect, reflect and apply real scientific data.”

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