Chemistry Teacher Brings Nanofiltration to His Classroom—Students to Impact Developing Nations Water Quality

Chemistry teacher David Mann has devised a plan that will enable his Santa Maria High School chemistry students to impact communities in Mexico. It began with Mann's NSF-funded Research Experience for Teachers (RET)—a six-week summertime experience doing cutting-edge research and developing curriculum for his classroom. This research has enabled him to give his chemistry students a chance to build a large-scale water filter, which has 99% effectiveness at removing disease-causing bacteria from non-potable water.

Under the guidance of Professor Arturo Keller and graduate student Peng Wang in the Donald Bren School of Environmental Science & Management, Mann investigated how effectively natural biofilters remove nanoparticles from water.

Then, with the assistance of Angela Berenstein, the National Nanotechnology Infrastructure Network (NNIN) Education Programs Coordinator at the University of California, Santa Barbara (UCSB), Mann and Berenstein co-developed several labs and activities that enhance the clean water unit. The size and scale activity reviews metric conversion using examples from the Guinness book of World Records. A guided lab and inquiry lab allow students to build and test a large-scale water filter. Mann would like to thank the Seeds of Hope International Partnerships and the Center for Affordable Water and Sanitation Technology (CAWST) for their assistance with the testing. All activities were linked to the science standards and can be downloaded at: http://www.nanotech.ucsb.edu/Education%20Images/RET2006/DavidMann.html

Coincidentally, at the culmination of Mann's RET experience, the local town of Casmalia—less than 12 miles from the high school where he teaches—had a water storage tank that became contaminated with bacteria, and water became unavailable for several days. This recent event and Mann's research experience is a vehicle for problem-based learning, facilitating an understanding of the importance of clean water and how research in nanofiltration is enabling the removal of bacteria and viruses of even smaller sizes from water.

Mann plans to take the learning experience further: Mann and about ten students plan to set up large-scale water filters at a ranch about an hour drive south of Mexicali, Mexico. If the trip is successful, Mann hopes to expand the effort. Currently, Mann is working to modify the curriculum and adapt it for elementary school children. Mann says the ultimate goal is to transfer the curriculum to Zambia Africa where Seeds of Hope International will teach local children about water quality and sanitation. This latest curriculum effort is in conjunction with the Chemistry Department at California Polytechnic State University San Luis Obispo and the Metropolitan Water District of Southern California. Mann and Cal Poly have been awarded a grant to develop curriculum for elementary and high school students in developing nations. Other supporting grants have come from the Santa Barbara County Education Office, Vandenburg Air Force Base, and the Santa Maria High School for work in water quality curriculum development.