

Sandia National Laboratories Education Outreach Activities**RECEIVED****AUG 30 1999****OSTI**

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The US Department of Energy and its national laboratories are a major employer of scientists and engineers and consequently have a strong interest in the development and training of a qualified pool of employment candidates. For many years the DOE and its national laboratories have supported education activities devoted to increasing the number and quality of science and engineering graduates. This is part of the DOE mission because of the critical national need for scientists and engineers and the recognized deficiencies in the education system for science and mathematics training. Though funding support for such activities has waxed and waned, strong education programs have survived in spite of budget pressures. This paper reviews a few of the education programs presently supported at Sandia by the Science and Technology Outreach Department. The US DOE Defense Programs Office and Sandia National Laboratories provide financial support for these education activities

A first step in developing scientists and engineers is to inculcate an enthusiasm for science in the early school years so that the students will take the necessary prerequisite math and science courses and pursue a science education. For many years Sandia has run a student enrichment program that strives to engage 5th-12th grade students in hands-on, inquiry-based science, mathematics, and engineering activities to develop an appreciation for science. These programs are unique in that a practicing scientist or engineer runs the activities. Volunteer instructors come from many organizations, including Sandia, US West, UNM, US Forestry Service, and the NM Professional Chapter of the American Indian Science and Engineering Society. The programs focus on students from ethnic groups historically underrepresented in the technical fields, and the role models are from the same ethnic groups. The student enrichment programs include Dream Catchers for Native American students, Hands-On Minds-On Technology for African-American students, and MANOS for Hispanic students. In FY99, approximately 500 students participated in these programs.

Sandia also funds the development of an advanced manufacturing curriculum in collaboration with West Mesa High School and the Albuquerque Technical Vocational Institute. This program established a four-year curriculum at West Mesa HS designed to motivate and train students in advanced manufacturing technologies and to decrease student attrition rates. The students learn to use AutoCAD software on Sun workstations as part of the program, and Sandia scientists and technicians provide guest lectures and prototyping assistance in the manufacture of actual products designed by the students. Successful graduates from this program, known as the Advanced Technology Academy, are qualified to work as operators in Sandia's Advanced Manufacturing Center, and also have sufficient math and science credits to enter a four-year institution or two-year community college to pursue a science or engineering degree.

The Science and Technology Outreach Department offers several student internship programs for undergraduate through graduate students that provide research opportunities for a summer, semester, or full time employment. The internship programs foster technical training and professional development in basic research, applied science, and engineering, as well as career guidance. The participants are selected from hundreds of applicants across the country and represent the best and brightest students in their fields: in FY99, the average GPA for the 171 participants was 3.6. Participants are provided round trip transportation and a competitive salary commensurate with their level of academic achievement. To enhance the student experience at Sandia, each student has both a social and a technical mentor. The student internship programs are also a significant and integral component of the Sandia recruiting strategy.

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The internship program includes a weekly speaker series addressing both technical and professional development topics, weekend field trips, classes on technical writing and oral presentations, and a student symposium/career fair. The symposium is an opportunity for the students to present their research activity with both an oral presentation and written submission. The student technical papers and a resume book of the student participants are distributed to the exhibitors and recruiters at the symposium. The symposium features a competition by grade level with six categories (four undergraduate levels, graduate, and post-doc) and the outstanding presenter from each level is awarded a Palm Pilot.

Over the past six years, 10% of all the student participants have been offered permanent positions at Sandia as Members of the Technical Staff. Of the offers tendered to the student participants, 96% have been accepted. The student internship program is also responsible for over 25% of the minority MTS (Members of Technical Staff) hires at Sandia.

An effort to improve the science education of prospective K-8 teachers was initiated at the University of New Mexico in 1994 with a collaboration between Sandia, the College of Education, and the College of Arts and Sciences. The collaboration, funded initially by Sandia then by the NM Commission of Higher Education, developed a hands-on, inquiry-based, integrated three-course science sequence that covered the topics of physics, chemistry, biology, and geology. This course sequence is now required for K-8 teachers at UNM. Sandia is now collaborating with the Southwestern Indian Polytechnic Institute (SIPI), a Bureau of Indian Affairs community college, to establish the same course sequence, and two courses of the sequence are in place now. Students successfully completing the core curriculum and special science three-course sequence will be eligible to transfer to UNM to complete a baccalaureate degree in education.

As a DOE national laboratory, Sandia has focused its education activities to promote the development of our future scientists and engineers and to improve public scientific literacy. This has included strengthening teacher knowledge of science, providing science enrichment activities for secondary students, offering challenging research opportunities for undergraduate and graduate students, and employment. These education activities have involved collaborations with many other agencies and industrial concerns, and it is important for the nation that scientists, engineers, research laboratories, and businesses continue with an active involvement in the education of future scientists and engineers as well as improving the general scientific literacy of the public.