

**The PACES Summer Science Trek;  
A Pre-College Science**

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**Introduction**

The University of Texas at El Paso (UTEP) received five-year funding to form the Pan American Center for Earth and Environmental Studies (PACES) in July 1995. PACES has as its goals to conduct research contributing to NASA's Mission to Planet Earth and to develop skilled scientists and engineers. PACES seeks to gain a more comprehensive understanding of geological, ecological and environmental processes and changes taking place in the southwestern United States and northern Mexico region. The PACES center has collaborative ties with two NASA field centers (Goddard Space Flight Center and Ames Research Center) and the Jet Propulsion Laboratory.

The original proposal contained no provision for outreach programs. However, at a meeting in the fall of 1995, **Dan Goldin**, NASA Administrator, issued the challenge that in order to accomplish NASA's goals to educate more of the citizenry in science and engineering, the Centers should take a broader perspective aimed at younger children.

**Objectives**

The objective of our program was to develop and support an interest by young women in science, mathematics, and pre-engineering coursework and to increase student awareness of the academic preparation necessary for such careers. Enrichment activities in the physical sciences, mathematics, pre-engineering and computer science, involved the use of simple equipment, toys, modern teaching techniques and the latest educational technology to stimulate the students. Additionally, the students were introduced to the environment and resources of the college and research organizations.

**Participant Recruitment and Selection**

Considering that women and minorities are emerging as significant talent pools in science, mathematics and engineering, and that they continue to be underrepresented in their fields, our program was aimed at young girls enrolled in Grades Six through Eight. The Girl Scouts were selected as our first group for two reasons. Dr. France Cordova, former Chief Scientist of NASA, once made the statement that of all the women she'd known at NASA, over 75% were former Girl Scouts. It was also suggested that a one-gender group might be easier to manage for our first effort. The Center coordinated its efforts with the Director of Program Services, Ms. Janet Brown, at the Rio Grande Girl Scout Council.

Initial participation in the summer outreach program involved about 30 Girl Scouts. Participants were held to an even number as the girls were partnered to share equipment and experiments. To screen the applicants, a form was developed which would allow candidates to be selected that perhaps had an undeveloped aptitude for science and would also enable statistical information requested by NASA to be collected.

## **Summer Program**

The core of the one-week summer program was a laboratory oriented hands-on experience in the physical sciences, engineering and computer science. The students were exposed to optics, mechanics, and electricity through the use of very simple equipment and toys (winding toys, balloons, roller skates, etc.) The total cost for the supplies for the program was approximately \$1,000. One-half of the expense was for rockets and engines which were built and launched on the last day of the program. Although new rockets will have to be ordered for the next group, the toys will be used for years to come, thus reducing the cost for subsequent years. An assortment of common household items such as straws, beads, straight pins and glue were also used. Using the toys grabbed the attention of the students, created the need to learn something new, provided the summary for closing a topic or unit, and facilitated easy integration into the curriculum.

## **Physical Facilities**

The University of Texas at El Paso provided the project with excellent modern physical facilities. The Computer Science Department donated the use of the Computer Lab, providing individual state of the art workstations for each participant. The participants genuinely enjoyed exploring the Internet with minimal supervision. Each individual was allowed to handle rocks and minerals from the Geology Department specimen lab, and the Engineering Department donated supplies and materials for the electrical experiments. Our participants were given guided tours of the various colleges and community facilities on campus during the lunch break.

## **Project Staff**

Dr. Andres Rodriguez, Professor of Physics of the University of the Pacific in Stockton, California, was engaged as a consultant to assist with the development of the curriculum and to conduct the first program. Dr. Rodriguez is widely recognized as a leader in minority outreach programs and has received numerous grants for such efforts from the U.S. Department of Education and the Department of Energy. He is also a consultant for the Exploratorium Science Museum in San Francisco. Dr. Rodriguez was assisted by the PACES Program Coordinator, Michelle Smith. Three senior electrical engineering students were recruited to provide daily instruction and personal attention. Additional UTEP students were recruited for selected demonstrations which included robotics, geology, and computer technology. Their presentations, together with interactions with our participants, were intended to motivate the children to learn more about careers and responsibilities for the future. The presence of successful undergraduate students as teaching assistants and mentors helped encourage the participants to think about their own college education at an early stage in their lives.

## **Summary and Future Work**

The young girls who participated in our program gained knowledge and confidence in science and how it relates to their every day lives. The students were exposed to many different aspects of the science and engineering fields in order to encourage them to explore these fields for possible future careers. Experience gained from our initial program will enable the Center to fine-tune the program to provide an interesting and exciting summer enrichment program in the years to come.

## **Acknowledgments**

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