

**PACES Participation in Educational Outreach Programs at the
University of Texas at El Paso**

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Introduction

The University of Texas at El Paso (UTEP) is involved in several initiatives to improve science education within the El Paso area public schools. These include outreach efforts into the K-12 classrooms; training programs for in-service teachers; and the introduction of a strong science core curricula within the College of Education. The Pan American Center for Earth and Environmental Studies (PACES), a NASA-funded University Research Center, will leverage off the goals of these existing initiatives to provide curriculum support materials at all levels. We will use currently available Mission to Planet Earth (MTPE) materials as well as new materials developed specifically for this region, in an effort to introduce the Earth System Science perspective into these programs. In addition, we are developing curriculum support materials and classes within the Geology and Computer Departments, to provide education in the area of remote sensing and GIS applications at the undergraduate and graduate levels.

Outreach into the Pre-service and In-service Teacher Community

One of our main education goals for 1997 is the development of a multi-year series of workshops for pre-service and in-service teachers in the El Paso area. Public school enrollment in El Paso area schools ranges from 40% to 100% Hispanic. This historically underserved population provides 85% of the students enrolled in the College of Education at UTEP. Of those students enrolled in the College of Education, 85% of the graduates return to area schools to teach. This provides an opportunity for a broad impact by programs introduced to pre-service Education majors at the university, and to ensure the introduction of the MTPE materials into the local public school curricula. It will also generate a population of future education majors familiar with the earth system science perspective. The impact of the continuation of the workshops beyond one year will be multiplied in this region because the students will be exposed to MTPE materials in K-12 and in their education programs at UTEP. In-service teacher participation in these workshops will be limited to no more than 25%, but we expect this participation to add an applied perspective to the workshops because the in-service participants will be carefully recruited from among the top science educators in the El Paso area public school systems.

The El Paso area comprises 12 independent school districts in which technology is an active agent for curricular reform. Technology is being introduced at every grade level, in a variety of applications. The El Paso ISD, one of the city's largest (85 schools), integrates technology in the early years by using computer-based programs to enhance reading/writing skills. Laserdisc technology is evident in every class in the elementary programs. We propose to expand on laserdisc technology use and enhance science curriculum in the classrooms through the introduction of the concepts of earth system science, by using both MTPE materials and materials developed specifically for this region through PACES. Our workshops will focus on providing pre-service teachers with the knowledge of how to incorporate earth system science into their science curricula, and practice in using existing technology, such as laserdiscs, software, and the Internet. In-service participants not only will gain insight into the incorporation of earth system science into their science curricula, but also will mentor the pre-service teachers in cooperative learning groups.

The objectives of these workshops include:

- * Integrate the earth system science perspective and the use of technology into current College of Education science core curricula subjects through the use of MTPE materials.
- * Make the whole concept of earth system science relevant by incorporating regional images, both ground and satellite, into the workshops, cooperating with the local NASA University Research Center (PACES) to select and process the satellite images.
- * Familiarize workshop participants with available MTPE materials in a hands-on environment.
- * Work in cooperative learning groups to develop lesson plans to accompany the MTPE laserdisc and regionally relevant images.
- * Put pre-service teachers in contact with designated mentor in-service teachers to use for future referral.

Workshop design:

The Partnership for Teaching Excellence (PETE), is a cooperative project among the Science, Math, and Education departments at UTEP that has fostered a continuity between the science core curricula classes and the teaching methods classes required of BIS (Bachelor of Independent Studies) students. This continuity is created by requiring students to apply the concepts learned in their science/math courses within their educational courses via the teaching methods classes. Our workshops will continue this process by becoming an extension of the teaching methods class, where the students enrolled in the class will be required to attend the workshop as part of their course requirements. The in-service teachers will be chosen from the teacher mentors who are already participating with UTEP in the Urban Systemic Initiative, (USI) which identifies exemplary in-service educators and offers enrichment programs and training. The workshop participants will be placed into several groups, each containing both pre-service teachers and one in-service teacher who will act as a mentor.

Faculty and staff from PACES and the UTEP departments of geology, math, physics, and biology will participate in presentation of materials in their fields, and will serve as resource people for both the BIS students and in-service teachers involved in the workshops. Most of these faculty members are already involved in the PETE program at UTEP and have worked on the development of the core curricula to integrate education methods classes with science and math classes.

The main focus of five of the workshops will be to expose teachers to the concepts and principles of earth system science, utilizing NASA MTPE materials and PACES-developed images. This will include the use of laserdiscs, videos, software, and the Internet. Since laserdisc players are readily available at schools and the laserdisc is a tool that most teachers are familiar with, each of the workshops will include the use of the NASA/CORE Earth Observation laserdisc. To tie in the concepts of earth system science and make those concepts relevant to this area, regional satellite and ground images will also be provided. The format of these workshops will include:

- * Introduction to the workshop topic. Introductory material will consist of general information related to the topic and specific information relevant to the local El Paso region. A specially-developed teacher's guide that will contain the introductory material and a listing of MTPE resources will accompany each workshop.
- * Hands-on activities within cooperative groups will be used as reinforcement of concepts introduced. These activities will include writing assignments in the form of lesson plans, the use of computers for software demonstration, and using the Internet to obtain updated materials.

* Presentation of NASA materials pertinent to the workshop topic to be used as an introduction, as a reference source for images, and as a demonstration of the use of technology in the classroom. The participants will evaluate MTPE materials available for classroom use at the NASA Regional Teacher Resource Center.

* Presentation, discussion, and evaluation of lesson plans developed by each group during the workshop. During each workshop the participants will employ concepts presented to develop lesson plans related to the NASA and regional materials provided by the workshop conveners. Each group will develop a lesson plan based on one type of technology (i.e., laserdisc, software, video, or Internet) available each workshop and will use a different technology at every workshop to gain experience in all types of technology.

* Preparation of a weekly e-mad journal by all participants that will be reviewed by the co-investigators to evaluate the progress of the workshops and to answer participants' questions. Participants will also keep an electronic portfolio with a compilation of their work. These portfolios will also be used by workshop conveners as an evaluation tool.

Workshop Topics: Earth System Science

Five workshops will present the earth system science perspective using MTPE and UTEP materials. Each workshop will focus on one aspect of earth system science: an introductory workshop, the lithosphere, the biosphere, the atmosphere and hydrosphere, and astronomy. A sixth, and final, workshop will consist of a field trip to the NASA Regional Teacher Resource Center maintained by the New Mexico Space Grant Consortium located at New Mexico State University in Las Cruces, New Mexico. The El Paso area satellite images processed by PACES and the lesson plans developed by the workshop participants will be available via the PACES web site.

College-level Education

During 1997 PACES will offer an upper-level undergraduate class in Remote Sensing Applications within the Geology Department. This is designed to be primarily a hands-on laboratory-type class, using the existing hardware, software, and imagery resources of PACES and the Geology Department, to teach students the about the practical image processing, image interpretation, and mapping/GIS applications that will enable them to use satellite imagery in their future graduate work and on the job. We will rely heavily on imagery from within the PACES area of geographic interest, so that field-checking will be an important aspect of the class. The course outline for this class has been condensed into a workshop for this conference. A graduate-level class in image processing and GIS is in the planning stages.

PACES personnel are working closely with professors from the Geology and Computer Departments to identify imagery and applications that can be used within existing classes. For example, PACES will be processing imagery that can be used to demonstrate basic principles in both Physical and Historical Geology classes. We are also working with professors to develop image-based exercises for Structural Geology, Geomorphology, Sedimentology, and Field Camp classes.

PACES personnel are also actively working with professors in several on-campus departments, to identify the appropriate imagery and technology that can be used to introduce MTPE materials within disciplines outside of the Geology and the Computer Departments. For example, PACES is processing a set of "change-detection" imagery of the El Paso area, spanning almost 20 years, which can be used for a variety of applications. We are coordinating these activities with the

Center for Environmental Resource Management (CERM) here at UTEP, in order to reach the broadest audience within the University.

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