An Innovative Approach to Integrate Earth Science Data and Research into Curricula at Tribal Colleges and Universities

TRibal Earth Science and Technology Education (TRESTE) Project

From

Universities Space Research Association
and Sinte Gleska University

Awarded in Response to

Strengthening Undergraduate Institutional Capacity in Earth System Science and Applications
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“Inspiring the Next Generation of Earth Explorers: Integrated Solutions for K-16 and Informal Education”
TRibal Earth Science and Technology Education (TRESTE) Project
(An Innovative Approach to Integrate Earth Science Data and Research into Curricula at Tribal Colleges and Universities)
Year One Progress Report
1 July 2005 – 30 June 2006

Project Summary:

The goal of this three-year project is to introduce and enhance the use of NASA Earth science data and products in Tribal College and University faculty courses thereby helping these faculty inspire undergraduate students to careers in Earth system science and related professions. This project represents a concerted effort in professional development focused at two- and four-year TCU undergraduate science-teaching faculty.

Summary of Activities:

April - September 2005: Recruited and Selected Tribal Schools
September 14-16, 2005: Strategic and Implementation Planning Meeting at Sinte Gleska University with James Rattling Leaf, Peg Tilgner and Leland Bordeaux. Finalized recruitment list and developed work plan for project implementation, and schedule for year one (A more complete description of the leadership team may be found at http://space.hsv.usra.edu/TRESTE/leadership_team.html).

October 3-5, 2005: Discussed project with prospective faculty at the Tribal College Forum IV in Denver, CO.

January 2006: Awarded grants for Sinte Gleska University and our eight partner TCUs.

January 4-6 2006: Conducted “Partner’s Needs Assessment Meeting” at the USGS EROS Data Center, Sioux Falls, SD (For a more complete discussion of the meeting visit the TRESTE Web page - http://space.hsv.usra.edu/TRESTE/needs_workshop.html).

• Introduced USRA and Tribal School Partners
  ▪ Blackfeet – Terry Tatsey, Mike McKay, Lea Whitford
  ▪ Fond du Lac – Jason Kennedy
  ▪ Fort Berthold – Kerry Hartman
  ▪ Little Priest – Jan Bingen
  ▪ Oglala Lakota – Sylvio Mannel
  ▪ Sinte Gleska – Leland Bordeaux, Peg Tilgner
  ▪ Sitting Bull – Gary Halverson
  ▪ Turtle Mountain – Audrey LaVallie
  ▪ United Tribes Technical – Jen Janecek Hartman, Mike Collins

• Discussed Potential Case Studies of Interest
  ▪ Water Quality
  ▪ Landscape – e.g., changes in flora, fauna, decision support for land management, Native American History
  ▪ Climate Change
  ▪ Energy – e.g., alternative energy sources,
  ▪ Weather – severe storms, significant changes in drought, heat wave,…
  ▪ Public Health/Infectious Diseases
  ▪ Native View on Intelligent Design

• Discussed Project Expectations
• Established Monthly telecon schedule to facilitate communications among participants
  ▪ 1st Tuesday of each Month – 12:30 CST
• Scheduled dates and location for the 1st workshop
February 2006: Facilitated AEROcam sensor 'fly overs' through the Upper Midwest Aerospace consortium to acquire high resolution images over target areas for partner schools.

April 2006: Sent Instrument Packages to Schools

June 1-3, 2006: 1st Project Workshop at United Tribes Technical College in Bismarck, North Dakota (For a more complete discussion of the meeting go to the TRESTE Web page - http://space.hsv.usra.edu/TRESTE/06workshop.htm). Focus of the workshop included:

- GIS and Remote Sensing Fundamentals Training
- Introduced Problem-Based Learning (PBL) Methods
- Incorporated PBL into Earth System Science Case Study on the Missouri River Drought issues
- Provided lab exercise that provided basic physical science concepts of evaporation, sublimation, and demonstrated the importance of albedo
- Discussed Project Evaluation Framework
- Established Outcomes for Year 2

June 2006: Designed and created the TRESTE Web page - http://space.hsv.usra.edu/TRESTE

Summer 2006 – Mentored a NASA Academy student, Jacci Bloom, from South Dakota School of Mines
Result Highlights at Eight Partner TCUs:

Blackfeet Community College

- Identified courses to begin integration
- Courses to be amended during academic year 2006/07 are: Blackfeet Studies courses, Science courses, Natural resource courses, Environmental courses, and Forestry courses.

Fond du Lac Tribal & Community College

- Proposed plan for using AeroCam data collected in Physical Geography (Geog 1010) and Intro to GIS (Geog 1050) courses.
- Proposed location for weather instrument package on the perimeter of campus near the Environmental Science Greenhouse that is currently being constructed. Students will be recruited to help setup the weather equipment during Fall 2006 classes.
- Garmin GPSMap76S receivers and Garmin MapSource TOPO software purchased will be used in Intro to GPS (Geog 1054) for fall 06/07 semesters and in the GIS Users Club activities each year.

Fort Berthold Community College

- Completed review of existing G.I.S. coursework and syllabus.
- Completed necessary paperwork and Curriculum Committee processes to adopt GE06.125 (Fundamentals of G.I.S., G.P.S., and Remote Sensing: R.S.) into F.B.C.C. course work.

Little Priest Tribal College

- Laid ground work to develop a GIS program at LPTC. The courses will be 'housed' in the Computer Science Dept. However, the focus of the materials being developed for these courses follows the Science courses (Ethnobotony course, Prairie Restoration course, and a Conservation Biology)
- Created a couple of mini modules (lessons) used in Computer Literacy course, using Problem Based Approach really generated some wonderfully enthusiastic discussions.
- Used the surface thermometer and GPS units to give students some hands-on experience

Oglala Lakota College

- Used TRESTE supported equipment (i.e., GPS), personal development, and curriculum ideas in the following courses:
  - **Remote Sensing – Viewing our Land from Space**
    Classification methods of satellite and airborne data, reviewed specific airborne and spaceborne systems and the physical background, digital manipulation and analysis techniques employed by today’s remote sensing technicians
Applications of GIS/GPS (3 credits) Fall 2006
Integrated approach to training in geographical techniques, an approach based on a problem-oriented synthesis of methods drawn from cartography, geographical information systems, spatial analysis, and field methods.

Workshop Title: GPS and GIS for Everybody (1 credit) special topics
Participants (K-12 teachers, firefighters, hunters, and tribal employees) received hands-on training on how to find and mark locations with a GPS and how to create maps using GIS. The workshop included a GPS treasure hunt, some technical background, as well as creating a map of Sioux Falls using aerial photos downloaded from the internet.

Sitting Bull College

- Developed activity modules for the Summer Science Academy, which was held the last two weeks of June. This Academy brings in about 30 local high school students one Sunday a month to do hands-on math, science and engineering activities.
- Dr. Guinn, Dr. Buresh, and Dr. Halvorson all conducted research during the summer of 2006, which included the use of GIS/GPS technology. Dr. Guinn used it to locate and monitor nesting sites. Dr. Halvorson used it to mark and measure the size of patches of leafy spurge, a noxious weed, growing on the Standing Rock Sioux Reservation. Dr. Buresh used it to mark sampling sites for many of his projects.

Turtle Mountain Community College

- Student interns during the winter located (by GPS) and photographed several dumps on the reservation for later use in taking chemical samples.
- A weather instrument station location has been requested by the science department and submitted to the plant manager.
- An environmental science curriculum using GIS has been written (and enclosed).

United Tribes

- Hosted the MODIS/Problem Based learning training at UTTC- June 1-3, 2006
- Received weather station-planned placement with the Green Committee & Construction Technology Department

Papers and Presentations:


Year Two Plans:

• Expected outcomes for TCU faculty include:
  ▪ incorporating Earth system science concepts into existing coursework by modifying lectures and/or developing new lectures and/or by modifying/enhancing course labs
  ▪ using image processing, Landsat data, MODIS land products, GIS technology, and/or other geospatial data in existing/new course/labs
  ▪ implementing outreach activities such as – provide training and/or presentations to other TCU faculty and staff members, K-12 students and teachers, and community elders, local business organizations, tribal government and/or tribal law enforcement.

• Conduct 2nd workshop