Tribal Colleges & Universities Project (TCUP)
Administered by the American Indian Higher Education Consortium (AIHEC)
Cooperative Agreement
Project Manager: Dr. Nancy Maynard
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301-614-6572

PROJECT DESCRIPTION

NASA's Tribal Colleges and Universities Project (TCUP) is a science, technology, engineering and mathematics (STEM) educational grant and mentoring program that specifically target Tribal Colleges and Universities. The overall goal of the project is to expand opportunities for the nation's STEM workforce through capacity building, infrastructure development, research experience, outreach, and information exchange. There are three primary elements of the project: 1) The TCUP Summer Research Experience (SRE), which provides NASA Center and expertise research, engineering, and education opportunities to Tribal College and University faculty and students; 2) The TCUP Enrichment Grant program, which provides funding for the improvement of education, research, and learning infrastructures; and 3) TCUP STEM planning, coordination, and information exchange activities.

PROJECT GOALS

1. Focus the Agency's attention on identifying and removing barriers to TCU participation in NASA programs that support Science, Technology, Engineering, and Mathematics (STEM) education and achievement by providing NASA Research Experiences for TCU Faculty and Undergraduates at each NASA Center. (Supports HE objectives 1.1, 1.2, and 1.3 for Outcome 1)
2. Expand outreach activities to improve the relationships between TCUs and NASA, with particular attention paid to activities designed to increase TCU familiarity with the Agency. Strengthen collaboration between NASA and AIHEC to improve high quality NASA education and research opportunities at the 36 Tribal Colleges. (Supports HE objectives 1.1, 1.2, and 1.3 for Outcome 1)
3. Enhance TCU STEM infrastructure, such as through creation of pre-engineering or engineering courses to establish an Engineering degree-granting program that will enable TCUs to expand research for Science and Exploration Systems. (Supports HE objectives 1.1, 1.2, 1.3, 1.4, 1.5 for Outcome 1)

PROJECT BENEFIT TO OUTCOME (1, 2, OR 3)

The Tribal College and University Project (TCUP) supports:

Objective 1.1 Faculty **and Research Support:** TCUP provides NASA competency-building education and research opportunities for faculty and researchers in several different ways: (1) The 2008 Summer Research Experience Internship/Externship Program provided research opportunities for 13 faculty members at 6 NASA Centers and/or at their own Tribal College. And (2) one faculty member was able to conduct NASA-relevant research through NASA-AIHEC Enrichment grants, and (3) 17 faculty members carried out research on NASA & climate related issues through the TCU Climate Change Initiative.

Objective 1.2 Student Support: (provides NASA competency-building education and research opportunities to individuals to develop qualified undergraduate & graduate students who are prepared for employment in STEM disciplines at NASA, industry, & higher education), and **Objective 1.3 Student Involvement Higher Education**: (provide opportunities for groups of post-secondary students to engage in authentic NASA-related, mission-based R & D activities) through (1) the 2008 summer Research Internship/Externship Program in which 31 students carried out NASA-related scientific projects in cooperation with a NASA/science or engineering mentor at 6 NASA Centers and (2) 21 students worked on science and engineering research projects through support of the NASA-AIHEC Enrichment Grants and (3) 34 students did research projects through the TCUP Climate Change Initiative

Objective 1.4 Course Development: (NASA-related course resources for integration into STEM disciplines) in several ways: (1) provided NASA engineering expertise to help establish an accredited B.S. in Computer Engineering degree program, the first four-year engineering program offered by any of the 34 tribal colleges in the United States at Salish Kootenai College, (2) the 2008 SRE Externship created special course material for the 3-weeks teaching experience at United Tribes Technical College Externship for the 15 students and 7 faculty in attendance in such areas as climate change, GIS, GPS, remote sensing, the scientific method (3) Navajo Technical College is creating a new course in 3D modeling, laser scanning and rapid prototyping services in collaboration with Marshall Space Flight Center. This course is intended specifically to prepare students for work assignments in these specialized skill areas, and eventually allow Navajo Technical College to contract with NASA for these services.

Objective 1.5 Targeted Institution Research and Academic Infrastructure: (Improve the ability of targeted institutions to compete for NASA research and development work) through a series of Enrichment Grants to 20 TCUs to build such capabilities as rapid prototyping, laser scanning, and advanced manufacturing at Navajo Technical College.

PROJECT ACCOMPLISHMENTS *(CONNECTION BACK TO ANNUAL PERFORMANCE GOALS AND PLANS)*

1. **Removing barriers to TCU participation through NASA Research Experience for Faculty & Students**. For those students reluctant to leave their homes, children, families, jobs NASA created the "externship" program in which the initial 3-week NASA portion of the externship was held at a tribal college, mostly within driving distance for students and then the remaining 7 weeks of research was held at the home institution, resulting in no or very little time away from families. Result = 100% success in enthusiastic completion of research

2. **Outreach.** NASA Project Manager visited 7 TCUs and met with TCU faculty, staff & students to explore requirements & research opportunities; Conference call coordination all year among NASA, AIHEC and Tribal Colleges participants to coordinate and enhance information flow; NASA and AIHEC increased communications to TCUs through AI/AN CCWG website, AIHEC website.
3. **Enhance TCU STEM infrastructure, Enhance such as through creation of pre-engineering or engineering courses program**. Provided NASA engineering expertise to help establish an accredited B.S. in Computer Engineering degree program, the first four-year engineering program offered by any of the 34 tribal colleges in the United States.

PROJECT CONTRIBUTIONS TO PART MEASURES (*INCLUDE DATA PLUS EXPLANATION)*

1. **Continue TCU STEM faculty and students summer research experience program at several NASA Centers during FY07 and FY08 (*Maps to APG 1 and Outcome 1: 1.1, 1.2, 1.3)***
   1.1: Faculty received training in GIS and remote sensing that prepared them to conduct earth surface dynamics research activities locally.
   1.2: Students worked with their faculty mentors on research teams that were given research methods training at a tribal college, after which they returned to their home institutions to conduct research in watershed and grasslands ecology.
   1.3: Six NASA Centers worked with 31 students on a variety of projects under the SRE program. This provided all participants an extremely valuable exposure to the reality of working at a NASA Center with professional researchers.
2. **Provide enrichment grants (under $25,000) to enhance NASA relevant education and research opportunities (Maps to APG 2 and Outcome 1: 1.1, 1.2, 1.3, 1.4, 1.5).**
   1.1: Faculty at Fort Peck Community College participated in a faculty development program that was intended to broaden the range of Computer Science topics in which they could provide instruction.
   1.2: Students at Sitting Bull College conducted field research tracking changes in the range of occurrence of several species of reptile indigenous to the region,
   1.3: Salish Kootenai College redesigned the developmental math program to promote student engagement through inquiry-based instructional methods. Math has been a significant obstacle to students pursuing a STEM career path. This is for this reason an important intervention, that may contribute to TCU best practices is developmental education.
   1.4: Ft. Peck created a series of interdisciplinary modules to enhance a range of STEM courses by focusing on specific knowledge areas that cross disciplines.
   1.5: Robotics equipment was acquired by Little Big Horn College to help develop their robotics program, which is being used as an outreach strategy to area middle schools and high schools.

3. **Convene one Tribal College Conference (Maps to APG 2 and Outcome 1: 1.1, 1.2).**
   . NASA supported the AIHEC Spring Student Conference, March 17-20, 2008. Bismarck, North Dakota, hosting faculty and students from 34 tribal colleges and universities.
   . NASA supported the 7th Annual Tribal College Forum at Haskell Indian Nations University, Lawrence, KS, August 12-14, 2008, hosting over 100 tribal college faculty, students, elders, climate scientists, federal and state agencies, private sector.
4. **Continue and enhance engineering classes,** both distance and on-site, to be taught at a Tribal College in order to enhance engineering education at the TCUs. (*Maps to APG 3 and Outcome 1: 1.1, 1.2, 1.4, 1.5)* Designed and delivered five courses by Goddard engineers: Computer Organization, Computer Architecture, Operating Systems, Signals and Systems, and Embedded Systems. The instructors have delivered the courses via videoconferencing augmented by short stays at SKC.
5. **Support establishment of an engineering degree granting program at a TCU**. (*Maps to APG 3 and outcome 1: 1.1, 1.2, 1.4, 1.5*) Provided NASA engineering expertise to help establish an accredited B.S. in Computer Engineering degree program, the first four-year engineering program offered by any of the 34 tribal colleges in the United States.

IMPROVEMENTS (e.g. project management, efficiencies, etc.) MADE IN THE PAST YEAR

. Created experimental "externship" program to accommodate female students, head of households – which was held out in Indian Country so students could go home during 3-week initial training, and made it possible for students to spend last 7 weeks of project research work at their home institution, thereby, eliminating almost entirely the need to be away from home for significant length of time (previously a barrier to many TCU students)

. Enrichment grants were each focused around a practical issue of direct relevance to local tribal impacts of climate change, thus demonstrating importance of NASA Earth science and STEM education to home issues

. Externship also provided hosting experience to the host TCU (United Tribes Technical College) for the 3-week NASA introduction to STEM principles & NASA remote sensing, valuable management training.

. Increased participation by students in TCU events/activities – e.g., AIHEC Conference, American Indian/Alaska Native Climate Change Working Group TCU forum VII,

. Closer coordination in the TCUP planning through more frequent and regularly scheduled conference calls among SRE externship and internship program.

PROJECT PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION (*THIS IS WHERE FURTHER FOLLOW-UP TO OCCUR FOR COLLECTING 2008 GRANTEE PERFORMANCE SUMMARIES FOR PUBLISHING TO OUR EDUCATION HOME PAGE)*

The following partners were instrumental in project execution: American Indian Higher Education Consortium (AIHEC), The American Indian/Alaska Native climate Change Working Group (AI/AN CCWG), American Indian Science and Engineering Society (AISES), United States Geological Survey (USGS), U.S. Environmental Protection Agency (EPA), North Dakota Tribal College Association, University Corporation for Atmospheric Research (UCAR) and National Center for Atmospheric Research (NCAR), The Climate Institute, Native View Project, the Center for Remote Sensing of Ice Sheets (CReSIS) of the University of Kansas.