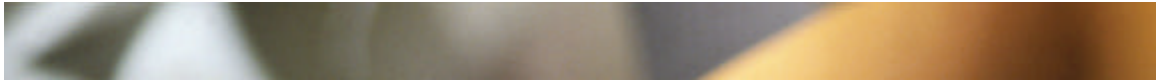


# *NSF's Tribal Colleges and Universities Program:*

Nations United in Improving Science  
and Technology Education for Native  
Americans



**NSF 02-072**



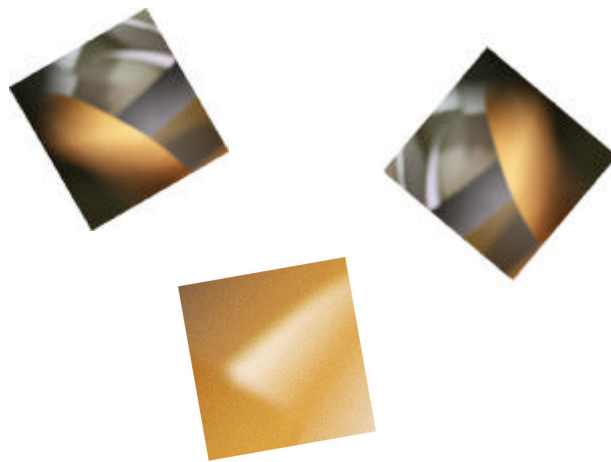
National Science Foundation

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“Today, tribal colleges are offering [the reservations and] tribal communities the chance to build knowledge, skills, confidence and pride in a way not possible for non-Indian institutions to offer. By recognizing and rewarding the accomplishments and contributions of these unique institutions, the nation will help them do even more—and everyone will share in their success.”

—*Native American Colleges: Progress and Prospects*,  
a report to the Carnegie Foundation for the Advancement of Teaching



## Executive Overview

Developed in accordance with the White House Initiative on Tribal Colleges and Universities (WHITCU) and begun in Fiscal Year 2001, the Tribal Colleges and Universities Program (TCUP) is the newest addition to the cadre of programs administered by the National Science Foundation's Division of Human Resource Development. TCUP provides awards to enhance the quality of science, technology, engineering, and mathematics (STEM) instructional and outreach programs, with an emphasis on the leveraged use of information technologies at Tribal Colleges and Universities (TCUs), Alaskan Native-serving Institutions, and Native Hawaiian-serving institutions. Support is available for the implementation of comprehensive institutional approaches to strengthen STEM teaching and learning in ways that improve access to, retention within, and graduation from STEM programs, particularly those that have a strong technological foundation. Through this program, assistance is provided to eligible institutions in their efforts to bridge the "digital divide" in access to STEM education and career opportunities.

As noted by WHITCU (2000), "Tribal Colleges are culturally based; they focus on local economic needs and address the whole person: mind, body, spirit, and family. More than 26,000 students from 250 federally recognized tribes now attend these institutions created by American Indians for American Indians. On reservations, where unemployment rates often exceed 50 percent, these schools often provide the only hope for gaining the education and skills needed to enter the modern workplace."

At the same time, Tribal Colleges offer more than 350 degrees and 180 vocational programs. While all give students the opportunity to earn two-year degrees, 75 to 85 percent of Tribal College graduates go on to earn a four-year degree or become employed in the local community (WHITCU, 2000).

TCUP's inaugural cohort of 9 single-year standard grants and 8 multi-year Cooperative Agreements are already having a significant impact on TCUs and Native-serving institutions. Serving over 100 tribes nationally and sponsoring initiatives in campuses in 10 states, TCUP awardees are changing the way in which these populations bring science and technology to their constituents.

## Program Background

The Tribal College movement began nearly four decades ago in order to make the U.S. higher-education system more responsive to the needs of Native Americans. Tribal leaders realized that only through “local, culturally based, and holistic methods could many American Indians succeed in higher education.” (WHITCU, 1999). As these efforts have grown in scope and ambition, they have remained true to a well-rounded approach to education that emphasizes the uniqueness of Native American peoples and underscores the relationship among sovereign Indian tribes, TCUs, and the Federal government.

To help guide implementation of Executive Order 13021 on Tribal Colleges and Universities, signed by President William J. Clinton on October 19, 1996, the Office of the White House Initiative on Tribal Colleges and Universities and Tribal College presidents have met frequently to discuss their priorities. In 1998, the Tribal Colleges established five priorities for initial implementation of the Order. These priorities are expected to evolve and change over time, but include—

- core funding;
- infrastructure – capital development;
- institutional development;
- private sector involvement; and
- tribal sovereignty and community self-sufficiency (WHITCU, 1999).

*“Education is the only lasting means for ending poverty on reservations and among Indian people.”*

*—Crow Elder*

For FY 2000 and 2001, the White House Initiative on Tribal Colleges and Universities and the American Indian Higher Education Consortium has focused on—

- *Core funding* for Tribal Colleges and Universities, including long-term funding and endowments;
- *Technology, science, and mathematics*, including workforce preparation and faculty development;
- *Facilities*, including linkages to the community;
- *Health Issues*, including community health services, preparation for healthcare professions and health-related research; and
- *Community Linkages*, including community development initiatives, leadership development, and preservation of Native culture and language (WHITCU, 1999).

*“Enhancing math and science instruction will help more young Native American men and women find a brighter future in an increasingly technological society.”*

*—Rita Colwell, NSF Director*

The first call for TCUP proposals was made in FY 2001. Underscoring the need for TCUP were the statistics submitted by principal investigators themselves. As examples—

- According to 1990 data, only 4 percent of Alaska Natives had achieved baccalaureate degrees.
- Native Americans continue to be vastly underrepresented in the STEM fields—especially in Information Technology disciplines—and as educators (NCES, 1998).
- Given the vast roadless distances between communities, the primitive state of rural Alaska telecommunications and information infrastructure and the high cost of such services when available, there are numerous problems of distance delivery to be identified, understood, and resolved.

- The Interior-Aleutians Campus and Bristol Bay Campus service area comprises 235,000 square miles and is 74% Native population. However, less than 0.5% of the students enrolling through these two campuses are full time students.
- In Montana, on community-college campuses where approximately 85 percent of the students are Native American, only 13 percent of those graduating with Associate Degrees have majors in STEM disciplines.
- The Pine Ridge Reservation is the second-largest reservation in the United States with over 12 million acres and approximately 11,000 residents. The average annual per capita income is \$3,800, and unemployment rates range typically between 70% and 85%. Shannon County, making up the larger part of the reservation, is generally listed as the poorest county in the nation.

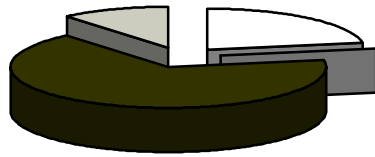
The first TCUP awards were made in September of 2001. The program's inaugural projects broadly address a number of common themes at a variety of Native American-serving institutions. These themes include—

- evaluating the content and format of existing STEM curricula;
- professional development for faculty, counselors, and mentors;
- promoting hands-on learning and research experiences for students;
- improved academic and professional motivation, guidance, and placement for students;
- forging connections between tribal members, community resources, academic institutions; and
- providing adequate facilities and a skilled labor force so that Native Americans can serve their own communities in scientific and technical endeavors.

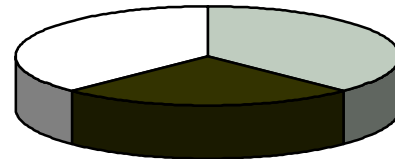
### **Award Summary**

Seventeen awards were made by the program in FY 2001. Of these, 7 awards were planning grants of approximately \$50,000, 2 were standard grants of a similar amount made to provide technical assistance to Tribal Colleges, and 8 were implementation awards—larger, multi-year Cooperative Agreements averaging \$2.35 million. Overall, more than 100 tribes nation-wide and TCU campuses in 10 states are represented by these projects. Collectively, the approximately \$20 million in FY 2001 TCUP awards represents nearly half the total NSF support (\$46.5 million) of Tribal Colleges and Universities from FY 1995 to FY 1999 (NSF, 1999).

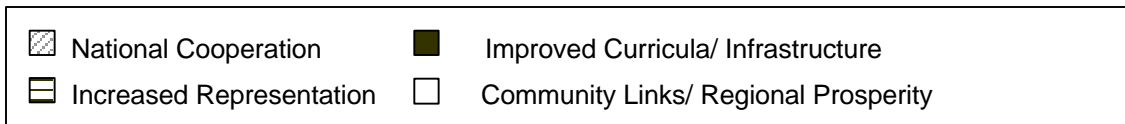
## TCUP's First Cohort of Awards



**Planning Grants**

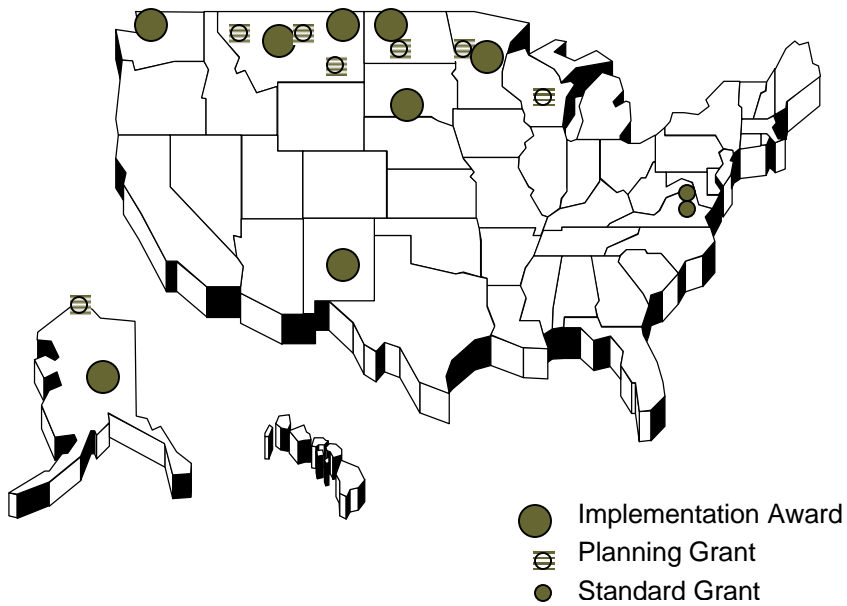


**Implementation Awards**



Source: NSF Division of Human Resource Development.

## National Distribution of TCUP Awards



Source: NSF Division of Human Resource Development.



## Goals of TCUP Awards

*For the interested reader, project abstracts and detailed award information for the TCUP projects summarized on the following pages can be searched at:*

*<http://www.fastlane.nsf.gov/a6/A6AwardSearch.htm> using the award numbers indicated in parentheses.*

### *Increasing National Cooperation*

As a new Federal program, TCUP is dependent upon the assistance and support of the community it serves on a national level. To this end, two grants were made to established Native-serving organizations to bring the benefits and lessons learned by all TCUP awards to the broadest possible audience.

- Based in Alexandria, Virginia, the **American Indian Higher Education Consortium** (AIHEC, #0117261) is an organization that includes members from 32 (TCUs) throughout the United States. Under the two-year standard grant of \$677,176, AIHEC will provide technical assistance to eligible institutions through workshops and site visits as well as on-line resources. The intent is to develop high-quality proposals and implement capacity-building projects as planning grants that promote and ensure TCUP goals and objectives, including the requirements of the Government Performance and Results Act (GPRA).
- A standard grant of \$249,509 has also been awarded to the **Information Technology Association of America** (ITAA, #0128850). Representing more than 500 members of the nation's technology industry, ITAA will use a pilot initiative to build linkages between its constituents and a core group of Tribal Colleges and Universities, Alaskan Native-serving institutions and Native Hawaiian-serving institutions. The project will be directly responsive to the recommendations of the Commission on the Advancement of Women and Minorities in Science, Engineering, and Technology (CAWMSET) with respect to improving access to and the quality of higher education for groups underrepresented in these areas. According to the project abstract, and in accordance with TCUP objectives: "The broad goal is to link the resources and expertise of ITAA and its members with those minority-serving institutions demonstrating the commitment and capacity to improve the technological and pedagogical infrastructure devoted to student learning, faculty and student research, and administrative processes."

In making technology recommendations, identifying user needs, establishing internships in ITAA-member firms, providing E-mentoring, and recommending curriculum and research enhancements, the project promises to have a broad impact on the nation's TCUs.

### *Increasing the Representation of Native American Populations*

An overarching goal of TCUP is the increased engagement and retention of Native Americans and, through the production of successful graduates, their participation in education and research careers. Accordingly, a number of TCUP awardees identified increased participation among their project objectives.

- Montana's **Blackfeet Community College** (BCC, #0124841) is using TCUP funds to develop its campus research infrastructure and improve its information technology (IT) program. Such improvements are necessary to achieve the project's primary goals: the increased enrollment of Native Americans in STEM disciplines and increased numbers of Native American graduates in these fields, especially as educators. As a five-year, \$2.4 million Cooperative Agreement, the project will strengthen collaboration between BCC and Montana State University-Northern to develop a joint IT curriculum that is receptive to Native American students. BCC also intends to enhance the staffing, content, and scope of its IT degree program, including professional development activities to enhance the skills base of all campus faculty. The IT infusion will support BCC programs such as the Ethnobotanical Greenhouse, the Weather and Water Lab, and the DNA Mapping Lab, which will also use students interns for research assistance. Summer session activities will further extend the scope and potential student audience of the project. Thirty American Indian STEM baccalaureate students will immediately benefit from the model program, which will raise the pool of American Indian IT educators in the state by more than 500 percent.
- A \$2.4 million Cooperative Agreement at North Dakota's **Fort Berthold Community College** will also seek to increase the number and persistence of American Indians in STEM fields. The project will accomplish this by improving the campus's technology infrastructure, adding constructivist methods to its STEM curriculum, and providing internships and workforce placement. Though a student retention model called Family Based Education, the project estimates that student persistence will increase 10 percent per year.

As part of the Agreement, faculty and staff development in teaching and learning methods and technology applications will also be utilized.

- New Mexico's **Southwestern Indian Polytechnic Institute** (#0123131) will also seek to increase the number of Native Americans graduating in STEM courses and entering the workforce in these fields with its TCUP Cooperative Agreement. The \$2.5 million project includes curriculum development in calculus, physics, and chemistry; standards-based faculty development; student experiences in research; and a program for networking professionals to address the need for Native American IT workers. Two-year students in the project will not only perform hands-on research, but will improve their communication skills by writing about the research process. Student enrollment and progress in the project will be monitored, with outcomes and lessons learned shared with other minority-serving institutions.

#### *Increasing Opportunities by Improving Education*

Even the most capable and motivated students can lose interest in academics if their exposure to educational materials and facilities is disappointing. To this end, several TCUP awards are striving to make their local programs and systems more responsive to student needs and more coherent with regional opportunities beyond individual campuses.

- In Minnesota, **Leech Lake Tribal College** (#0123247) will use a \$50,000 TCUP planning grant to evaluate its mathematics and science program and facilities. LLTC will also conduct surveys to determine factors affecting student engagement, retention, and motivation. The project will also address student transitioning to four-year institutions, state and Federal funding opportunities, and regional activities, programs, and classes for student and faculty development.
- In Alaska, **Ilisagvik College** (#0123244) received a TCUP planning grant of \$49,989 to assess and improve its STEM programs as the lead college in the non-profit Consortium for Alaska Native Higher Education (CANHE), Inc. The intent of the project is to retain Alaska Native and rural students in STEM courses and ultimately increase the number of STEM graduates from these communities. The CANHE STEM master plan includes the colleges' resources, governance, culture, technology requirements, and funding strategies as well as an assessment of needed faculty and available instructional skills.

- A planning grant of \$50,000 to North Dakota's **Sitting Bull College** (#0123236) will be used to perform a needs assessment of four groups of students: students in careers that do not require extensive STEM education, students who intend to enter STEM fields, students interested in careers—such as business and human services—which require quantitative methods and reasoning, and students entering careers in K-8 teaching. The intent is to make science, mathematics, and learning opportunities more relevant by addressing individualized needs.
- Montana's **Chief Dull Knife College** (#0123215) received a \$45,406 TCUP planning grant to perform an assessment of its STEM curriculum as a precursor to application for a full Cooperative Agreement in FY 2002. The project will include metrics of program effectiveness and tracking of STEM graduates, especially those transferring to four-year institutions.
- At **Fort Belknap College** (FBC, #0122968), a \$49,999 TCUP planning grant will be used to restructure and revise existing mathematics curricula to increase student success. Alternate methods that have proven successful with minority students will especially be considered. The results of the one-year project will be used to prepare FBC for a full TCUP competition in FY 2002.
- **Stone Child College** (#0122965) also received a \$50,000 planning grant to help provide a learning environment for its students that will meet or exceed the learning environments afforded by four-year institutions and to increase the number of American Indian graduates in STEM. The project includes the development of a five-year institutional plan suitable for a TCUP Cooperative Agreement and in cooperation with other SCC activities.
- **Fort Peck Community College** (#0122809) has begun a \$2.3 million Cooperative Agreement for its "Tribal Colleges and Universities: Science, Mathematics, Engineering and Technology Enhancement" project, which will pursue outcomes-based activities in curriculum enhancement, faculty development, and undergraduate training via internships and transfers to four-year institutions. Appropriate student placement will increase the completion rate to 70 percent, and infrastructure improvements—including computer laboratories and wireless communication—will increase enrollment in advanced STEM courses.

- In Washington State, the mission of **Northwest Indian College** (NWIC, #0123214) is “to provide post-secondary educational opportunities for Native Americans that is sensitive to their worldviews, background, and academic needs and goals, and prepare them for the challenges of leadership in their tribal communities.” The \$2.3 million TCUP Cooperative Agreement with NWIC will additionally increase students’ academic competence by developing clear communication skills, critical thinking skills, and enhanced civic responsibility. The College’s Division of Math and Science will implement an educational plan that intends to support its students from a developmental freshman level through degree completion. The project is a modified version of NWIC’s Tribal Environmental and Natural Resource Management program, which has produced much higher than average retention and completion for students lacking needed communication and analytical-thinking skills.

*“Northwest Indian College students have demonstrated they must be immersed in their culture, history, and philosophy if they are to effectively understand and build upon their role in the Native communities . . . As they build increased self-esteem while finding success in the classroom, students will recognize their capacity to do science and math. They will then feel comfortable pursuing further science and math-related courses as they eventually enter baccalaureate programs and the STEM workforce.”*

*Principal Investigator,  
Northwest Indian College*



### *Increasing Prosperity*

Recognizing that economic success is tied inherently to the quality and level of education, some TCUP awardees hope their investment in academe will pay dividends to the community beyond the campus.

- South Dakota's **Oglala Lakota College** (OLC, #0123149), a four-year institution with 1,300 students in 10 centers across the Pine Ridge Reservation, received a \$2.5 million Cooperative Agreement for its TCUP proposal, "Sustained Economic Growth of the Oglala Lakota Nation through Development of the Technological Infrastructure." OLC, already an NSF-funded Model Institution for Excellence offering STEM degrees and increasing the number of Native American STEM graduates, is additionally seeking to develop a pool of scientists and technicians to staff community research facilities or start businesses of their own. The project will also promote faculty development and strive to increase the number and quality of laboratory facilities available to STEM graduates, beginning with a research center housing certified state and Federal labs. Partnerships with tribal agencies and local institutions will serve to re-invest capital in the reservation's economy and contribute to the autonomy of the project.
- The **University of Alaska Fairbanks** (#0123147) received a \$1.9 million TCUP Cooperative Agreement for its *Hutlee/Umyuarchdelee* proposal (Athabascan/Yupik words for leader, a good thinker). The five-year project will adopt and adapt model programs with proven success in educating minority students, including enhancement of gatekeeper courses, active-learning techniques, a "Master Learner" curriculum, and internships. The project further proposes to recruit five student cohorts from 90 of Alaska's 220 villages. The resulting learning community will continue through semester sessions, summer sessions, and transition to four-year degree programs.



*"[One potential impact of the Hutlee/ Umyuarchdelee project is the development of] knowledgeable Alaska Native leaders who will participate in making decisions about tribal lands that will forever change the lifestyles, economics, and existence of rural Alaskan communities."*

*— Clara Johnson  
Principal Investigator,  
University of Alaska Fairbanks  
Interior Aleutians Campus*

- A \$2.5 million TCUP Cooperative Agreement with Minnesota's **Fond du Lac Tribal and Community College** (FDLTCC, #0123121) puts into action the recommendations and input of several stakeholders to the college's technology and science planning process. The project includes high-performance computing technology to augment education and research activities in environmental science, soil mapping, computational science, and information technology. The project also gives students experience in a collaborative research environment with experiments designed to reinforce what they are learning. Linkages will also be forged between FDLTTC and the University of Minnesota's Laboratory for Computational Science and Engineering, and existing research partnerships will be enhanced. Faculty development will increase the number of MS and Ph.D.-qualified STEM faculty and curriculum development activities have been created to increase the number of Native American graduates in STEM fields.
- Wisconsin's **College of the Menominee Nation** (#0123059) received a \$50,000 planning grant to develop its STEM programs. The college will assess its existing infrastructure, mathematics preparation, and community and institutional needs on the Menominee Reservation, as well as those on the Oneida, Mohican, and Potawatomi Nations and neighboring non-Indian communities. Outcomes from the analysis can then provide student research opportunities in environmental science and environmental health.

*“To forward its 8,000 years of stewardship and expertise in sustainable forest management, the Menominee Nation is committed to ensuring that future generations are prepared as stewards well-schooled in sound sciences and best practices in Menominee autochthony. Our challenge is to assure that quality in [STEM] education is commensurate with that stewardship.”*

*— Verna Fowler  
Principal Investigator,  
College of the Menominee Nation*

### **A Legacy for the Future Built on Wisdom from the Past**

In their brochure, *Tribal Colleges and Universities Guide the Way*, WHITCU observes: “For many people, the broken desks, rickety typewriters and dilapidated trailers that characterized the first Tribal College classrooms of 1968 might have been symbols of the educational and economic struggles faced for centuries by American Indians. To a determined group of tribal leaders, however, they were the stepping-stones to a destiny of self-sufficiency and achievement that would strengthen Indian nations for generations to come. Today’s Tribal Colleges and Universities are the

The National Science Foundation, through its administration of the Tribal Colleges and Universities program, recognizes this vision of the past and looks forward to helping Native Americans achieve their dreams in science and technology for generations to come.



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## Directory of TCUP Principal Investigators

*Principal Investigators for the inaugural cohort of TCUP awards listed alphabetically.*

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