AMERICAN INDIAN HIGHER EDUCATION CONSORTIUM

STATEMENT
OF THE
AMERICAN INDIAN HIGHER EDUCATION CONSORTIUM
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HEARING ON BROADENING PARTICIPATION IN STEM
HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY
MARCH 16, 2010

Mr. Chairman and distinguished members of the Committee, on behalf of my institution, Little Big Horn College in Crow Agency, Montana and the 35 other tribally-chartered colleges and universities that collectively are the American Indian Higher Education Consortium, thank you for inviting me to testify on the institutional and cultural barriers to broadening student participation in science, technology, engineering, and mathematic degree programs. I am pleased to comment on efforts to overcome these barriers at Tribal Colleges and Universities and to provide a few recommendations on strategies for increasing and improving federal agency support for efforts to ensure that all Americans, including the First Americans, can succeed in high quality STEM education programs and successfully enter the national STEM workforce.

My name is *Baluxx Xiassash* -- Outstanding Singer. I am a member of the *Uuwuutasshe* Clan and also a child of the *Uuwuutasshe* Clan of the *Apsáalooke* or Crow Indians. The Crow reservation is located in what is now south-central Montana and contains about 3000 square miles – a territory larger than the state of Rhode Island – of rolling hills, high plains, grasslands, badlands water and wetlands. In the early 1980s, my tribe established Little Big Horn College, forging a new tradition in education to nurture Crow Indian professionals whose life work would build the Crow community. The goal was to establish a lasting tradition of advanced training and higher education, for a good path into the future for the Crow People. I am proud to say that I truly am a product of my tribe's commitment to higher education: as a student, I graduated from Little Big Horn College; as a faculty member, I taught at the college. Later, after earning advanced degrees, I became an administrator, and now, as president of Little Big Horn College, it is my responsibility to keep building the path into the future for my people, a path that includes new technologies, Native and environmental science, and partnerships in emerging STEM fields.

This morning, I will speak briefly on three topics: The Tribal College Movement in general; the role of Tribal Colleges in broadening participation of American Indian students in STEM fields and the challenges and barriers facing our institutions as we carry out this work; and finally, the role of the National Science Foundation's TCU program in helping our institutions to develop STEM degree programs and possible strategies for improving the

program. I ask that my written statement, along with attachments, be included in the Hearing Record.

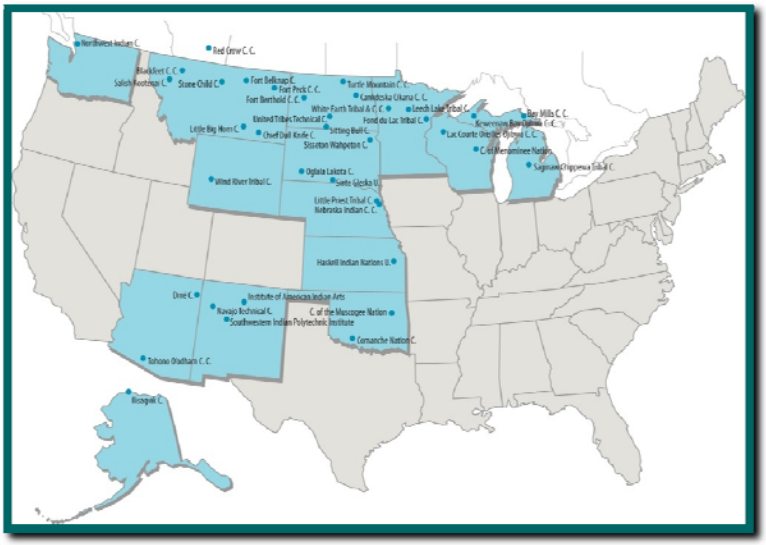
BACKGROUND: THE TRIBAL COLLEGE MOVEMENT

Mr. Chairman, I do not know how well acquainted you or the members of this Committee are with Tribal Colleges and Universities, as I do not believe we have ever testified before you, or interacted with you or your staff prior to last month. Perhaps you do not know of our near daily struggles to survive as the most poorly funded institutions of higher education in the country, or of our tremendous successes, from our work to build self esteem and change the life and future of a student through a nurturing educational environment that is culturally-based and relevant to that student, to our efforts to build stronger and more prosperous Tribal nations through the restoration of our languages, applied research on issues relevant to our land and our people, workforce training in fields critical to our reservation communities, and community-centered economic development and entrepreneurial programs.

American Indian tribally chartered colleges and universities are young, geographically isolated, poor, and almost unknown to mainstream America. Our institutions are also extraordinarily effective catalysts for revitalization and change -- so much so that we have been called "higher education's best kept secret."

Located in some of the most rural and impoverished regions of this country, Tribal Colleges are planting resilient seeds of hope for the future; nurturing and sustaining languages, cultures, and traditions; and helping to build stronger tribal economies and governments. Yet, the oldest Tribal College is younger than many of the people in this room. My institution, Little Big Horn College, celebrated its 30th anniversary this year. Our oldest institution, Diné College on the Navajo Nation, turned 40 last year.

The Tribal College philosophy is simple: to succeed, American Indian higher education must be locally and culturally based, holistic, and supportive. The education system must address the whole person: mind, body, spirit, and family. Today, the nation's 36 tribal colleges are located throughout Indian Country: all seven tribes in Montana and all five in North Dakota have colleges. Tribal Colleges are also located in the Southwest, the Great Lakes, and the upper Northwest. We are expanding in all regions, including Alaska and Oklahoma, and through distance education programs, our colleges are reaching all of Indian Country.



In only a few short decades, Tribal

Colleges have grown from very humble beginnings to thriving academic centers. Little Big Horn College, for example, began in the early 1980s in two trailers and a garage that was serving as a barn. In the early years, the college had about 30 students. Today, the college averages more than 400 students each semester and focuses on 10 degree programs in areas critical to our tribe's economic and community development.

Little Big Horn College, like all Tribal Colleges, is first and foremost an academic institution, but because of the number of challenges facing Indian Country – high unemployment, poorly developed economies, significant health issues, and lack of stable community infrastructures -- Tribal Colleges are called upon to do much more than provide higher education services. Tribal Colleges, such as Little Big Horn College, often run entrepreneurial and business development centers. Many TCUs are the primary GED and Adult Basic Education provider on their reservations, and all TCUs provide a variety of evening, weekend training and para-professional programs for tribal employees, BIA and IHS staff, K-12 schools, tribal courts and justice system staff, and many others. TCUs operate day care centers, health promotion and nutrition programs, community gardens, and often, the community library and tribal museum or archives. Tribal Colleges have strong partnerships and linkages with the local K-12 education system, offering Saturday and summer "bridge" programs for high school students, running summer camps for youth, and providing after-hours gymnasiums and computer labs for young people.

In terms of agriculture and land-based programs, Tribal Colleges are working diligently to sustain our lands and waters. With 75 percent or more of all tribal land being forested or agriculture based, sustaining our environment is of critical importance to our people. Several TCUs are involved in climate change research and education projects, funded by NSF and the National Aeronautics and Space Administration. This semester, 15 TCUs launched a distributed, online Introduction to Climate Change course, developed collaboratively from a Native perspective through funding awarded to AIHEC by NSF.

Perhaps most important, Tribal Colleges are actively and aggressively working to preserve and sustain their own tribal languages and cultures. All TCUs offer Native language courses, and in fact, passing a language course is a condition of graduation from a TCU. In some cases, the tribal language would have been completely lost if not for the Tribal College. Turtle Mountain Community College in Belcourt, North Dakota, was established primarily for this purpose, and over the years, its success in preserving and revitalizing the Turtle

Mountain Chippewa language has been unparalleled. Fort Belknap College in Montana runs a K-6 language immersion school, right on campus. At the White Clay Immersion School, children learn the White Clay language and culture in addition to subjects they would normally study at any other school.

Many TCUs offer unique associate and bachelor degree programs, as well as in-service training, in elementary education. At the TCUs, teacher education programs follow cultural protocols and stress the use of Native language in everyday instruction. Well over 90 percent of teachers who graduate from a TCU teacher education program begin teaching on the reservation shortly after graduation, providing positive role models to Indian children.

Finally, Tribal Colleges are accountable institutions, always striving to be more accountable to our funders, our students, and our communities. Several years ago, AIHEC launched an ambitious and landmark effort called "AIHEC AIMS," which is a comprehensive data collection system for TCUs, created by tribal college faculty and presidents, community members, funders, students, and accrediting agencies, aimed at improving our ability to measure and report our successes and challenges to our key stakeholders. Today, each Tribal College reports annually on a comprehensive set of 116 qualitative and quantitative indictors allowing us, for the first time, to share the true story of our success with funders, and most important, with our communities.

Tribal Colleges have advanced American Indian higher education significantly since we first began four decades ago, but many challenges remain. Tribal Colleges are poor institutions. In fact, Tribal Colleges are the most poorly funded institutions of higher education in the country:

(1) First: Tribal Colleges are not state institutions, and consequently, we receive little or no state funding. In fact, very few states provide support for the non-Indian students attending TCUs, which account for about 20 percent of all Tribal College students. However, if these students attended a state institution, the state would be required to provide the institution with operational support for them. This is something we are trying to rectify through education and public policy change at the state and local level.

(2) Second: the tribal governments that have chartered Tribal Colleges are not among the handful of wealthy gaming tribes located near major urban areas. Rather, they are some of the poorest governments in the nation. In fact, three of the ten poorest counties in America are home to Tribal Colleges.

(3) Finally, the federal government, despite its trust responsibility and treaty obligations, has never fully-funded our primary institutional operations source, the Tribally Controlled Colleges & Universities Act. Today, the Act is appropriated at about $5,784 per full time Indian Student, which is less than half the level that most states fund their institutions.

To continue to thrive and expand as community-based educational institutions, Tribal Colleges must stabilize, sustain, and increase our basic operational funding. Through tools

such as AIHEC AIMS, we hope to better educate the public, lawmakers, and federal officials about the cost-effective success of our institutions. Through opportunities such as this, we hope to share with the Congress and others how we are helping to meet the challenges facing our tribal nations.

TRIBAL COLLEGE STEM PROGRAMS: THE SIGNIFICANCE OF NSF-TCUP

Although Tribal Colleges and Universities have made unprecedented strides in addressing the higher education needs of American Indians, much work and many challenges remain.

Of all groups in the U.S., American Indian students have the highest high school drop-out rates in the country. A 2010 report published by the Civil Rights Project/Proyecto Derechos Civiles at UCLA's Graduate School of Education and Information Studies revealed that less than 50 percent of all American Indian high school students actually graduate. If these students eventually pursue higher education, it is most often through the Tribal Colleges, which like other community colleges are open-admission institutions. In addition to offering a significant level of GED preparation and testing, Tribal Colleges face challenges with remediation and developmental education. On average, more than 75 percent of all TCU students must take at least one developmental course, most often pre-college mathematics. Of these students, our data indicates that many do not successfully complete the course in one year. Without question, a tremendous amount of TCU resources are spent addressing the failings of the K-12 education systems.

For this reason, TCUs have developed strong partnerships with their K-12 feeder schools are actively working, often through their NSF-TCU programs, to engage young students – early on and consistently – in community and culturally relevant science and math programs.

Because of the challenges TCUs face in engaging under-prepared students in STEM, improvement and innovation in science and mathematics education programs have been areas of great interest to most Tribal Colleges. However, the challenges to successful delivery of comprehensive STEM programs at the TCUs are also significant. Prior to NSF-TCUP, most Tribal Colleges were unable to secure the resources needed to build high quality STEM programs because we were not able to compete successfully in existing STEM programs sponsored by NSF and the U.S. Department of Education – most likely because we lacked the required PhD.-level principal investigators, could not demonstrate the "impact numbers" because of our size and remote locations, or simply could not afford the professional grant writers available to the much larger and fully resourced mainstream institutions.

Beginning in Fiscal Year 2001, NSF-TCUP changed this by making available essential capacity building assistance and resources to Tribal Colleges, either through direct funding or by leveraging funding from other sources. In fact, in less than 10 years, NSF-TCUP has become the primary federal program for building STEM capacity at the nation's Tribal Colleges and Universities. NSF-TCUP has served as a catalyst for capacity building and change at Tribal Colleges, and the program can be credited with many success stories, as detailed below. In fact, in terms of impacting enrolled members of Federally recognized

Indian tribes, the only data on the success of American Indians in higher education, and in STEM degree programs in particular, is collected by Tribal Colleges and Universities.

In implementing NSF-TCU programs, Tribal College administrators have attempted to take a broad view and systemic approach to their STEM needs, maximizing the return on NSF's investment through leveraging support from foundations and other Federal programs. TCUs now have greater capacity to address the STEM education and research needs of the tribal communities they serve in holistic and culturally relevant ways, which have been shown to increase retention and completion. More American Indians are entering STEM education and more are entering STEM professions, as demonstrated by enrollment and completion increases of 200 to 300 percent or more in some cases. STEM faculty are becoming more effective and engaged STEM instructors and researchers. Students are becoming more engaged, and with guidance from their faculty, they are becoming involved in cutting-edge and community-relevant research in significantly greater numbers. Classrooms and laboratories are better equipped. American Indians are more aware of the importance of STEM to their long-term survival, particularly in areas such as climate change. Partnerships between TCUs and major research institutions are emerging in areas of education and research, including pre-engineering.

Examples of successful STEM programs at the Tribal Colleges, funded by the NSF-TCU program, include:

Sitting Bull College, Fort Yates, North Dakota

- Established BS programs in Environmental Science and Secondary Science Education
- Enhanced student recruitment and retention efforts
- Created numerous student research opportunities
- Integrated traditional knowledge in STEM instruction

Outcomes

- 20 student research projects presented at scientific conferences; prior to NSF-TCUP funding, no presentations had been given by students
- Dramatic increase in average STEM enrollment: *tenfold i*ncrease since 2004 (from 3 students to an average of 30 students)

Lac Courte Oreilles Ojibwa Community College, Hayward, Wisconsin

- Providing scholarships to STEM majors
- Improved access to STEM courses through alternative teaching modalities (e.g. distance learning)
- Incorporated Ojibwa traditional ecological knowledge into 41 courses to improve STEM literacy and establish cultural connections with STEM disciplines

Outcomes

- Realized a significant improvement in student retention (**88% retention** for scholarship recipients)
- 380% increase in STEM courses offered online, reflecting burgeoning demand on the part of students

Sisseton Wahpeton College, Agency Village (Sisseton), South Dakota

- Established a Computer Science and Technology degree program
- A BS degree program in Information Technology is being submitted for accreditation
- Partnering with area K-12s on a mathematics literacy program
- Providing professional development opportunities for STEM faculty and staff

Outcomes

- Establishing a local resource pool of trained computing professionals where there had been none before
- Reducing number of high school graduates requiring remedial math courses
- Providing a strong general science curriculum that is preparing students to pursue STEM fields of study

Turtle Mountain Community College, Belcourt, North Dakota

- STEM enrichment programs offered at area K-12 schools
- Expanded STEM course offerings, supplemented with computer aided instruction
- Developing an environmental science degree program
- Establishing research partnerships with 4-year institutions

Outcomes

- Traditional ecological knowledge-centered outreach activities motivate area students to pursue STEM at TMCC
- 300% increase in STEM graduates
- Significant increase in the percentage of STEM majors at the college

College of the Menominee Nation, Keshena, Wisconsin

- Acquired/upgraded science and physics labs on main and branch campuses
- Hired PhD level STEM faculty to develop and offer new programs
- Established new Materials Science and Pre-Engineering programs
- Established successful STEM Scholars and Leaders student retention programs

Outcomes

- Menominee students have access to a variety of high quality STEM programs with good career potential
- CMN is developing high quality research programs
- STEM programs are achieving high levels of student retention and transfer

Fort Berthold Community College, New Town, North Dakota

- Establishing an Elementary Teacher Education Program with an emphasis on Math and Science
- Working with area middle and high schools to improve student enrollment in STEM courses
- Encouraging student transfer to Baccalaureate programs in STEM
- Established student research program

Outcomes

- Improved preparation of incoming freshmen in STEM
- Significantly increased number of students majoring in STEM and continuing on to 4-year institutions to pursue BS and advanced degrees

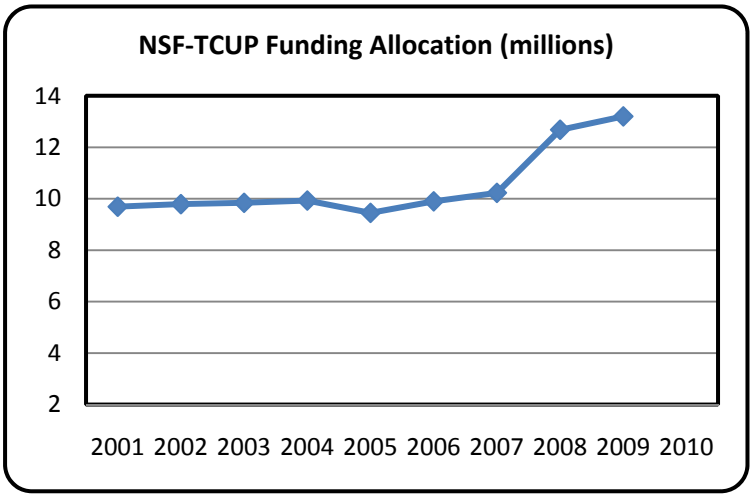
Oglala Lakota College, Kyle, South Dakota

- Established high quality online STEM courses
- Acquired state of the art science labs
- Providing K-12 STEM teacher professional development
- Established research collaborations with South Dakota universities

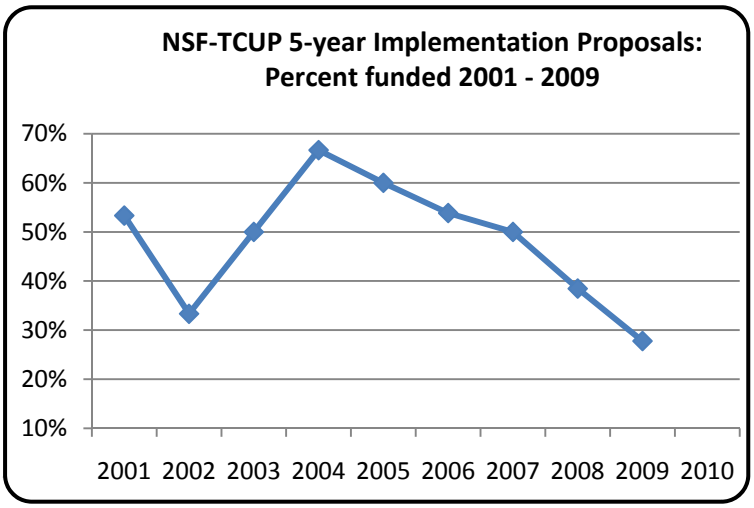
Outcomes

- Established a tribal STEM workforce in environmental science with graduates working in tribal agencies responsible for land and resource management, water quality, among others
- Improved quality of STEM instruction in area K-12 schools
- Conducted locally relevant environmental research

Despite the success of the NSF-TCU program and its demonstrated impact on American Indian STEM participation, we believe that the program must have increased support from the Administration and the Congress. We need such a commitment as we work to address the growing technology, science, and math crises facing our communities. The need for increased funding for the NSF-TCU program is well documented. In fact, between 2001 and 2007, NSF-TCUP funding was essentially static, as it has been again since 2008.



Further, since 2004, the percentage of proposals funded has declined each year, reaching an all-time low in 2009.



In 2009, less than 30 percent of all proposals were funded, out of a pool that includes only 33 eligible Tribal Colleges and Universities.

Clearly, the need for STEM-related funding at TCUs is not being fully addressed by available funding.

SYSTEMIC CHALLENGES TO BROADENING PARTICIPATION

We believe that the National Science Foundation and NSF-TCUP, in particular, could serve as a model for how Federal agencies could support strategies to alleviate institutional and cultural barriers to broadening participation of students pursuing science, technology, engineering, and mathematics (STEM) degrees and professions. However, outside of the NSF-TCU program, significant barriers to participation still exist and NSF's "broadening participation" effort has not been entirely successful. In fact, in some cases, it has had the effect of doing harm to Tribal Colleges and adversely impacting American Indian STEM education, as mainstream institutions seek to improve their chances to be competitive in grant competitions.

Throughout our history, states and mainstream institutions have taken advantage of Tribal Colleges and our students, adding us to their grant proposals and including our students in their statistical reports, without ever speaking to us or even notifying us that we are being used help them secure funding. Needless to say, we rarely receive any funding, technical assistance, or outreach when these proposals are successfully reviewed and awarded, and traditionally, we had no way of knowing how NSF or the awardee dealt with the lack of TCU inclusion after the award was made.

Over the past several years, as NSF's broadening participation requirement has grown in importance, the number of proposals from mainstream institutions seeking to include Tribal Colleges -- without our knowledge or only after the proposal is completely developed – has increased dramatically. In fact, the situation became so frustrating that in early 2008, the AIHEC Board of Directors, on which the presidents of all accredited TCUs sit, approved a motion urging federal agencies to adopt a policy that that any proposal for federal funds, which directly or indirectly names Tribal College(s) or AIHEC in the proposal, but is not submitted by a Tribal College or University or AIHEC, must include documentation confirming that Tribal College administration or AIHEC, as relevant, is fully informed of and supports the college's role in the proposed project. The goal of this motion is to ensure that fewer proposals are funded that include TCUs without our knowledge or agreement and therefore fail to address the TCU priorities in a manner that is likely to prove successful, or whose project budget fails to include the resources necessary for the TCU to accomplish stated goals.

I am pleased to report that in the last year or two, we have noticed an increasing awareness among NSF program officers about the need for Tribal Colleges to be truly engaged as partners in proposal preparation and program implementation. We can cite specific examples, including one situation this year, in which a proposal was submitted by a researcher at a mainstream institution to provide STEM faculty and student development involving Tribal Colleges, but without any indication of input from the TCUs and certainly without any expressions of support. The researcher contacted AIHEC only after the NSF program officer specifically told the researcher to reach out to TCUs. Clearly, NSF's internalization of its broadening participation commitment has led to an increased awareness

by program officers, and we believe this was a key factor in the program officer's directive to reach out to the TCUs.

Other Current Realities.
According to faculty and administrators at the Tribal Colleges, TCU faculty simply are not competitive in NSF-sponsored grant competitions, when compared to research faculty at major universities. Heavy teaching loads, responsibilities to other institutional programs, and obligations to participate in community activities severely limit the time TCU faculty have to write proposals, conduct research, and develop manuscripts for publication. Further, the institutions themselves lack the funding needed to hire experienced researchers and adequate support staff, including grant writers and assessment professionals. (See "Background" above on funding levels.) One TCU faculty member testifying before the NSF's Committee on Equal Opportunities in Science and Engineering stated that her institution had applied for an NSF grant outside of the NSF-TCU program on three occasions, at the recommendation of the NSF program officer. However, the project was not funded, despite high peer review scores and a demonstrated need, because the TCU lacked an adequate Ph.D.-level faculty member to serve as principal investigator in the Native science research.

Another problem facing TCUs is the size and remoteness of our rural institutions. These factors are often viewed negatively when panelists review TCU grant proposals and when we begin potential partnership negotiations with faculty members from larger universities. "How many students are they going to be able to affect?" is a common question, one TCU faculty reports. His response to this question is, "How many Native American students are in your science programs?" The answer is typically 1-3 students, based on self-reporting. The faculty member's institution, Sitting Bull College in Fort Yates, North Dakota, enrolls nearly 30 American Indian students in the Environmental Science program alone. Without NSF-TCUP, these students would not have been reached.

We are often told that TCU proposals are eliminated from competition by panelists and program officers who do not understand the unique situations of Tribal Colleges and our students. We are trying to build a community, not just a single program. Many of our efforts focus on developing basic math, science, and writing skills, along with showing students that opportunities they never dreamed of are possible, but only to the extent that we can be successful in securing funding.

RECOMMENDATIONS

RECOMMENDATION ONE: *Maintain and increase targeted funding for Tribal College & University STEM Infrastructure, Education, and Research Programs.*

Given NSF's proposal in the Fiscal Year 2011 budget to eliminate the TCU program and instead offer one program for several different types of minority-serving institutions, our first recommendation is to maintain this vitally needed program, and to the extent possible, provide increased funds to ensure equitable participation by all TCUs. We believe it is important to note that NSF's decision was made without publically providing any research or analysis in support of the proposal and without discussion or, in the case of tribally-charted institutions of higher education, without consultation.

We urge the federal government, led by the National Science Foundation, to show an authentic commitment to broadening participation in STEM by honoring this nation's commitment to build the infrastructure of *all* segments of the U.S. academic and research community. In our view, this is the only way to guarantee that ALL Americans, including the First Americans, can fully and actively participate in the effort to achieve our collective STEM education and research goals. Given the unique needs of Tribal Colleges and Universities, the government-to-government relationship between federally recognized Indian tribes and the federal government, the federal Trust Responsibility, and the programs' demonstrated success and need, we believe that it is imperative to maintain and expand funding for the NSF-TCUP.

Historical Justification. In the early 1980s, just as Little Big Horn College was establishing itself in two old trailers and a barn, the National Science Foundation established the national supercomputing centers program because "American researchers were at a serious disadvantage for gaining access to leading-edge high performance computers when compared to colleagues from other countries or to [researchers in key federal agencies.] NSF leadership recognized that the lack of a suitable infrastructure was hampering important basic research…"

Congress infused NSF with resources, which funded the national centers, along with roughly 80 institutions of higher education. The foundation for today's technology infrastructure was in place at key institutions of higher education, and academia was on its way to cyber-enhanced research and education.

But that world did not reach Crow Agency, Montana or Rosebud, South Dakota. Not one Tribal College was funded during those early days, nor for many subsequent years. No one from the tribal college community even participated in the discussions and debate in 1984, or later in 1994 when the program was up for reconsideration. And so, where are the Tribal Colleges today, vis-à-vis mainstream institutions and many Historically Black Colleges and Universities and hundreds of Hispanic Serving Institutions (and even the state-supported Native Hawaiian and Alaska-Native serving institutions)? Today, our institutions are where these groups were in their early developmental days, before the infusions of federal funding. How do our institutions get to where other institutions are today, so that we can begin to compete on an even playing field? The same way the other institutions did: through support and collaboration with federal agencies, led by the National Science Foundation, and through collaborations with other institutions of higher education around this country and the world.

Tribal Colleges, no less than any other institution, deserve the opportunity to grow. We should, and must, be part of the future of technology-mediated STEM education and research in this country and the world. And if inclusion means that funding must be dedicated to help the Tribal Colleges and other minority serving institutions build their infrastructures, then it must be done, just as it was in the past for others. They demanded no less. Why should we?

If this is not done, TCUs will continue to be missing from the list of institutions participating broadly in NSF programs. "Broader participation" will apply to all but reservation-based American Indians and their tribally-chartered institutions of higher education. We know that

this will be the case because today, most if not all, TCUs are unable to successfully compete in NSF programs beyond TCUP, primarily because of a lack of understanding and serious consideration by program officers and peer reviewers, as described above.

RECOMMENDATION TWO: ***Length and Focus of NSF-TCUP Awards***

Given the limited pool of TCU applicants (33 accredited TCUs) and the need to build – often from the ground up – and sustain STEM programs for a length of time deemed sufficient to achieve improvement at all levels, NSF should be directed to:

1. Make grants under the NSF-TCU program for a period of 10 years, or alternatively, five years, with ongoing support for an additional five years (without the need to re-enter a program competition), provided the programs meet appropriate NSF criteria for satisfactory progress; and

2. Refrain from expanding or prioritizing purposes within the NSF-TCU program in new areas (e.g. K-12 teacher education, which previously had been supported by NSF under the Urban and Rural Systemic Initiatives) until sufficient funding exists to meet the basic STEM needs of TCUs and reliable data demonstrates a significant improvement in basic STEM education participation and completion rates across TCUs.

We recognize that a need exists to address STEM education at all levels. However, funding is severely limited under the NSF-TCU program – it has not grown significantly over the years. Therefore, should NSF personnel believe that additional areas need to be addressed or additional programs established, beyond those proposed by TCUs under the general NSF-TCU program, new funding should be requested or designated, rather than reprogramming funds appropriated for vital basic STEM education and research programs. This is particularly important when the new funding priorities established under programs such as NSF-TCUP would replace programs eliminated elsewhere within NSF.

Under the existing NSF-TCUP, funding should be permitted to address critical areas of need, including:

- Research and development of culturally relevant STEM curriculum, for all grade levels, including in Native languages;
- STEM outreach and partnerships among TCUs and K-12 feeder schools and 13-16 programs/institutions to ensure seamless pathways into STEM professions
- Best practices in addressing gateway and bottleneck courses that are necessary for students pursuing STEM degrees and professions
- Innovative and collaborative curriculum development
- Comprehensive student support services
- Faculty development and support
- Acquisition of laboratory equipment/instrumentation
- Acquisition and application of emerging technologies
- Expansion of undergraduate research capacity and opportunities
- Partnerships with other institutions of higher education, including mainstream and MSIs, for research and technology assistance (possibly using the AN-MSI model,

which was a project funded by NSF to EDUCAUSE, involving the three primary MSI communities)
- Increased technical assistance and project management assistance for awardees, as explained above.

RECOMMENDATION THREE: ***Take steps to ensure that proposals and programs impacting Tribal Colleges and their students include adequate consultation and partnerships***

We request assistance in enforcing and measuring compliance with a requirement that any collaborative proposal involving TCUs in which a non-TCU is the lead institution must include, among the supporting documents, letters of support and commitment from the TCU signed by an authorized representative of the institution or the American Indian Higher Education Consortium. (For more information, please see Attachment A).

RECOMMENDATION FOUR: ***Consider re-invigorating the NSF's "Rural Systemic-Tribal College Initiative" or establishing a new grant program to increase partnership opportunities between TCUs and K-12 schools and programs***

In the 1990s, through the National Science Foundation's Tribal College Rural Systemic Initiative (TCRSI), 20 TCUs partnered with their local school districts to achieve successful and sustainable improvement of STEM programs at the K-14 level. Founded on the assertion that all students can learn and should be given the opportunity to reach their full potential, Tribal Colleges led the effort to achieve "whole system change." Parents, tribal governments, schools and the private sector are working with the colleges to:

- Implement math and science standards-based curriculum for all students;
- Implement math and science standards-based assessment for all schools;
- Implement math and science standards-based professional development for teachers, administrators, and community leaders; and
- Integrate local Native culture into math and science standards-based curriculum.

The close working relationship between the TCUs and K-12 schools was paying off, according to the National Science Foundation, which reported that successful systemic reform had resulted in:

- Clear evidence that the program is significantly enhancing student achievement and participation in science and math;
- Significant reductions in the achievement disparities among students that can be attributed to socioeconomic status, race, ethnicity, gender, or learning styles;
- Implementation of a comprehensive, standards-based curriculum aligned with instruction and assessment, available to every student served by the system and its partners.
- Convergence of all resources that are designed for or that reasonably could be used to support science and math education -- fiscal, intellectual, and material -- both in formal and informal education settings-- into a focused program that upgrades and continually improves the math and science program for all students.
- Broad-based support from parents, policy makers, institutions of higher education, business and industry, foundations, and other segments of the community for the goals and collective value of the initiative.

Despite its demonstrated success, the program was terminated some years ago. This is the type of program that should be reinvigorated and strongly supported by the Congress and NSF.

RECOMMENDATION FIVE: ***Expand EPSCoR inclusion and encourage NSF to use a centralized approach to learn about the capacity and needs of Tribal Colleges & Universities***

Over the past few years and as a result of changes in law and policy, senior level NSF administrators have begun developing strategies to better serve TCUs and American Indians. For example, in FY2010, the NSF's Engineering Directorate committed funds to TCUP to support pre-engineering activities at TCUs. Following long-needed changes in program requirements, EPSCoR programs are finally beginning to include TCUs in state-based programs in more meaningful ways. Although several EPSCoR states are home to TCUs, North Dakota and New Mexico have taken notable steps to include TCUs. For the past few years, the North Dakota EPSCoR program has allocated funding to support a statewide Tribal College liaison, although the liaison is housed at the state university rather than a TCU, and it is providing relatively limited program funding to support EPSCoR activities at TCUs in the state. Recently, we have been told that NSF's Biology Directorate has been developing strategies to outreach to the TCUs. While we are encouraged by this effort, we respectfully suggest that the National Science Foundation could be more effective if it would work through our central organization, AIHEC, to discuss our needs and capacities and develop realistic outreach strategies. Approaching TCUs through a centralized source and capitalizing on the expertise of our Board's STEM Committee is a cost effective strategy for engaging our institutions.

A centralized model could also be used to coordinate a program whereby NSF would take the lead in developing and implementing a cross-cutting Federal initiative in which Federal agency officials and program officers spent a summer (or equivalent time period) in Indian Country and serve as mentors to STEM programs at TCUs and Indian-serving K-12 schools.

RECOMMENDATION SIX: ***Encourage coordination and leveraging of various NSF programs to help build TCU capacity***

We believe that NSF should launch a coordinated effort to empower and encourage TCUs to link programs and opportunities to better meet the needs of American Indian students. For example, NSF-TCU programs could be more effectively linked with EPSCoR, as discussed above, as well as the Louis Stokes Alliance for Minority Participation and other existing NSF-supported programs across Directorates. Further, the National Science Foundation could establish faculty exchange programs, among Minority Serving Institutions, as well as with faculty at mainstream institutions and national research laboratories.

RECOMMENDATION SEVEN: ***Technical Assistance for and about TCUs and new research involving the challenges confronting efforts to broaden participation among American Indians***

Based on a motion of the AIHEC Board of Directors, which comprises the presidents of all the nation's accredited TCUs, we recommend that any grants or contracts for technical

assistance under the NSF-TCU program should be awarded to an Indian organization, which the NSF Director finds is nationally based, represents a substantial American Indian constituency, and has demonstrated expertise in Tribal Colleges and Universities and American Indian higher education. This will help ensure that the unique needs of TCU students, faculties, and institutions are addressed effectively and efficiently in a context that optimizes TCU-focused capacity building. We urge that technical assistance be provided to the TCUs so that we are more competitive in grant competitions, and that technical assistance be provided to NSF and other federal science agencies to ensure that they understand and are responsive to the unique needs and characteristics of Tribal Colleges and Universities and American Indian students.

We also recommend that the National Science Foundation fund research examining the challenges to STEM engagement that American Indians face to STEM engagement, including a study to evaluate the capacity of the TCUs' physical infrastructure to support high quality STEM programs, research on underlying risk factors, and sociological studies designed to better understand the social dynamics impacting STEM education in Indian Country, and dissemination of best practices and model programs.

RECOMMENDATION EIGHT: ***Blue Ribbon Panel on MSIs & Cyberinfrastructure***

We believe it would be productive for the Congress to direct the National Academy of Sciences or the National Science Foundation to establish a "Blue Ribbon Panel on Minority Serving Institutions and Cyberinfrastructure," with the goal of producing a report and action plan for ensuring the active inclusion of minority serving institutions (MSIs, including TCUs, Hispanic-serving Institutions, and Historically Black Colleges and Universities) in Cyberinfrastructure development, research, and education programs. In addition, we recommend that Congress encourage or mandate each Directorate within the National Science Foundation to study and report on its efforts to engage American Indians in its programs.

We are grateful, Mr. Chairman, for this opportunity to share our story, our successes, and our needs with you today. We look forward to working with you to achieve broader participation in STEM degree programs and to achieve our nation's post-secondary education and STEM workforce goals. Thank you.

AIHEC

AMERICAN INDIAN
HIGHER EDUCATION CONSORTIUM

121 Oronoco Street • Alexandria, VA 22314 • 703.838.0400 • FAX: 703.838.0388

March 26, 2008

Deborah J. Cavett
Executive Director
White House Initiative on Tribal Colleges and Universities
1990 K St., N.W. Room 7010
Washington, DC 20006

Dear Ms. Cavett,

On behalf of the nation's 36 Tribal Colleges and Universities (TCUs), which comprise the American Indian Higher Education Consortium (AIHEC), I am writing to voice an ongoing concern regarding federally funded collaborative projects involving TCUs and other higher education partners, in which the tribal colleges play a minor, and often token role. Over the past several years, we have encountered an increasing number of cases in which one or more tribal colleges is included in a proposal, either without any real participation on the part of TCU academic administrators in the planning process, or in some cases without actual knowledge about the project proposal prior to submission.

We understand that most federal grant programs make an effort to support proposals that are likely to have an impact on underserved populations. We believe that this priority has led to a situation where TCUs are sometimes used to demonstrate the project's "broader impact" for the benefit of the reviewers. However, if the proposal is ultimately funded, project activities often fail to address priorities of the tribal college in a manner that is likely to prove successful, or the project budget fails to include the resources necessary for the TCU to accomplish stated goals.

The tribal colleges have strong partnerships among mainstream higher education institutions that have led to positive programmatic outcomes for all institutions involved. However, an attitude exists among some institutions that tribal colleges can be exploited for their status as minority serving institutions, with little need to work with them as equal partners.

To address this concern, we respectfully request that the following policy be established within all federal grant programs: *Any collaborative proposal involving TCUs in which a non-TCU is the lead institution must include, among the supporting documents, letters of support and commitment from the TCU signed by an authorized representative of the institution (e.g. the president, chief academic officer, or director of sponsored programs).*

Although this measure alone is not likely to rectify this problem, it will help limit some of the more excessive abuses the tribal colleges have experienced. This request results from a motion passed by the AIHEC Board of Directors, on which the presidents of all accredited Tribal Colleges and Universities sit, at our Spring 2008 Board meeting in Bismarck, ND. The motion is as follows:

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MOTION: That the AIHEC Board of Directors requests that the White House Initiative on Tribal Colleges and Universities (WHITCU) urge all federal departments and agencies to require that any proposal for federal funds (in response to a Request for Proposals or "RFP"), which directly or indirectly names tribal college(s) or AIHEC in the proposal, but is not submitted by a tribal college or university or AIHEC, must include documentation confirming that tribal college administration or AIHEC, as relevant, is fully informed of and supports the college's role in the proposed project. Further, the Board directs AIHEC staff to prepare and send a letter to all federal departments urging the adoption of the policy set forth above. OUTCOME: The motion was agreed to by voice vote.

I am confident that you will work with federal agencies to address this important issue, and I thank you for your attention to our concerns. Please do not hesitate to contact me should you have any questions.

Sincerely,

Cheryl Crazy Bull

Cheryl Crazy Bull
Chair, AIHEC Board of Directors and
President, Northwest Indian College

Sisseton Wahpeton College

To: Carrie Billy, President of AIHEC
From: Diana Canku, President of SWC
Subject: NSF-TCUP
Date: March 12, 2010

The National Science Foundation's (NSF) *Tribal Colleges and University Program* has been vital to the growth of the Sisseton Wahpeton College in the area of STEM education. The original TCUP award was funded in 2004, and concentrated on the development of a Computer Science and Technology (CST) degree at SWC. During that time SWC graduated ten students from the program, and over fifteen students are working in the field, primarily at tribal agencies or businesses.

SWC has developed the curriculum for a bachelor's degree in IT, which is being submitted to the Higher Learning Commission for approval. This would be the college's first four-year degree program. TCUP also provided funding for our CST instructor to complete his master's degree. Additional information is provided in the attached files.

In the fall of 2009, the National Science Foundation awarded SWC with a second TCUP grant. This project is in the very early stages, but is already showing great potential. SWC is working in partnership with two of the tribal K-12 schools, and two public schools on the reservation to improve mathematic literacy. This will included the possibility of dual credits for the advance students. SWC is also negotiating a new articulation agreement with South Dakota State University as the college develops a new Sustainable Environmental Studies degree program.

One of the greatest impacts that NSF has had at SWC is capacity building. While every federal agency requires a high level of accountability, NSF has been at the forefront in providing assistance to the tribal colleges in developing this capacity. The small, program specific conferences, such as the TCUP Leader Forum, have been very productive, especially for new PI/PDs. Additionally, the grants funded by NSF to provide professional development for PI/PDs demonstrate a commitment to success after an award is made. The recent initiatives by the Engineering and BIO directorates provided tribal colleges a unique opportunity to be heard prior to the development of programs targeting our institutions.

Programs like the NSF-TCUP are instrumental to the continued growth of small tribal colleges, such as SWC. It is extremely difficult to compete with the larger institutions, such as some of the Native Hawaiian serving institutions that currently eligible in TCUP. If this was expanded to all minority serving institutions (MSI) most of the small tribal colleges would be shut-out of the competitions.

P.O Box 689, Agency Village, South Dakota 57262 Phone: 605-698-3966 Fax: 605-742-0394
Email: president@swc.tc

Sisseton Wahpeton College

State universities with a small number of Native American students would be able to apply for funding stating that they would serve the needs of the reservation. Unfortunately, this rarely happens in reality. Only two years ago a major NSF award was made to a state university that listed SWC as a partner institution. No one at our college approved of, or even was aware of this "agreement". This decision could easily make this situation common place once again.

One only need look at the history of awards made by NSF over the last several decades to see the value of programs like NSF-TCUP to the tribal colleges. During that time period only a handful of awards were made to tribal colleges from other Directorates; about eight from the BIO Directorate, and few others in other programs such as ATE. A similar case is what happened with the Department of Defense grants.

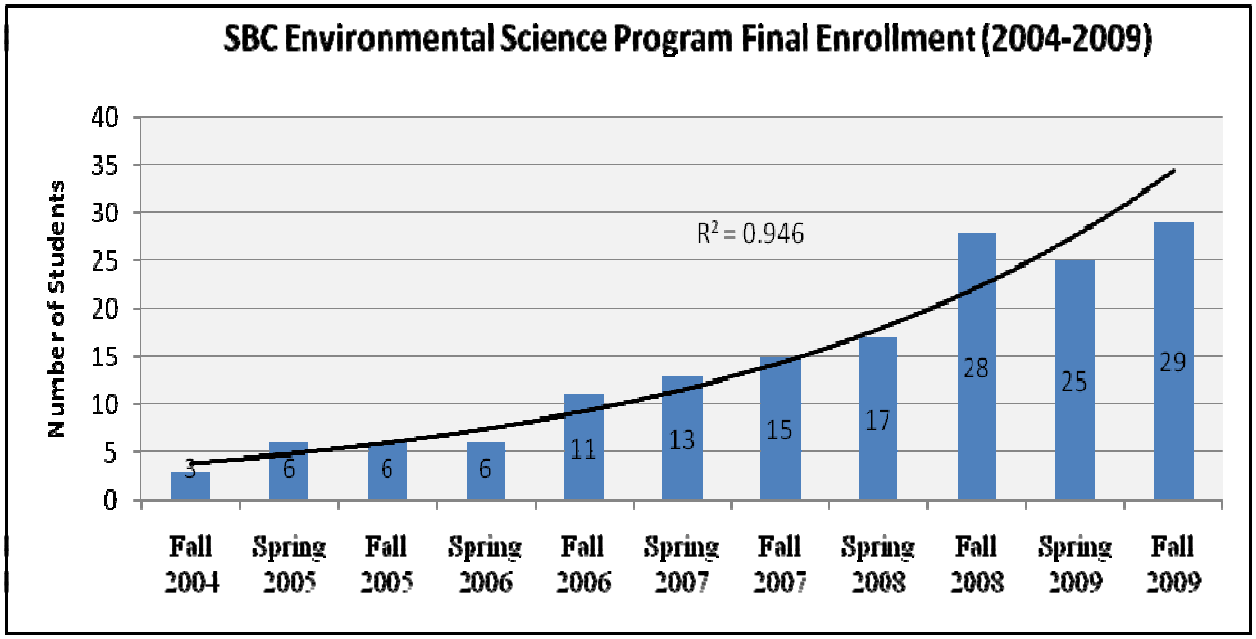
It has also been extremely valuable to have program officers who are knowledgeable about tribal colleges. Reviewers often comment on the small number of students, the lack of grant experience perspective principal investigators have, the lack of tenure for senior personnel. One proposal submitted to the Informal Science Education program was marked down for the lack of student numbers, although it included every 8th to 12th grader in a thirty mile radius. A different outreach proposal was in part rejected because a reviewer did not understand that the K-12 computer classes are not taught by teachers with computer science backgrounds. Programs like NSF-TCUP, and their program officers, understand these realities. Unfortunately, this proposed change would make it very difficult for small tribal colleges to receive awards that have the greatest impact on these most vulnerable students.

Please contact us if you need any further information.

P.O Box 689, Agency Village, South Dakota 57262 Phone: 605-698-3966 Fax: 605-742-0394
Email: president@swc.tc

SITTING BULL COLLEGE
FORT YATES, NORTH DAKOTA
NATIONAL SCIENCE FOUNDATION: SBC-TCUP PROGRAM
March 2010

The overall goal of Sitting Bull College's National Science Foundation-Tribal College and University program (SBC-TCUP) is to increase the number of Native American students completing STEM degrees. The SBC-TCUP project is designed to develop science programs by integrating culture, developing student research opportunities, and enhancing recruitment and retention programs. Our successes have been built on a theme of community involvement and undergraduate research. The TCUP program has been very successful in increasing enrollment and number of graduates in our primary degree program (Environmental Science) and in STEM programs throughout the institution. Since TCUP implementation in 2004, we have added our first B.S. science programs in Environmental Science and Secondary Science Education. In our initial graduating class from the B.S. Program, two students entered graduate programs at Montana State University and University of New Hampshire, one student is a full-time biologist with an environmental consulting firm, and the final student is lead laboratory technician at the SBC Analytical Lab. Since 2007, more than twenty student research projects have been presented at scientific conferences, with several students receiving Best Paper or Poster awards. Prior to TCUP implementation, no presentations were given at external meetings. Most importantly, the TCUP program has helped to build a research culture within the institution and has developed a foundation of collaboration with other federal, state, and Tribal agencies.



Justification for maintaining a separate TCUP program:

SITTING BULL COLLEGE
FORT YATES, NORTH DAKOTA
NATIONAL SCIENCE FOUNDATION: SBC-TCUP PROGRAM
March 2010

We, as Tribal College faculty, are not competitive when compared to research faculty at major universities. Heavy teaching loads, heavy commitment to institutional committees, and maintaining community ties severely limits the time we have to write proposals, conduct research, and develop manuscripts for publications. But, our strategies for mentoring undergraduate scientists is exceptional and is beginning to show profound outcomes (students going to STEM graduate programs, presentations at scientific conferences, publications in scientific journals) for our students. The NSF-TCUP program is unique in the type of colleges that it serves. HBCUs and HACU-member institutions include many large and prominent universities with full support staffs including grant writers, assessment professionals, and hordes of established scientists on which to build a proposal.

The size of our institutions based on enrollment is often a detriment when panelists review our proposals or in informal discussion with faculty members from larger universities. "How many students are they going to be able to affect?" is a common question. My response to this is: "How many Native American students are in your science programs?"—the answer is typically 1-3 students. SBC has almost 30 Native American students in the Environmental Science program alone. Without NSF-TCUP, these students would not be reached.

Having served on several review panels, proposals can be eliminated from competition by a panelist or a program officer that does not understand the unique situations of Tribal Colleges and the unique situations of our students. We are trying to build a community, not just a program—many of our efforts go to developing basic math, writing, and speaking skills and showing students the opportunities that exist beyond their doorstep.

Tribal Colleges have suggested several times that a 5-year program is not enough to show the kind of progress that NSF expects, because of the reasons discussed here. Progress and measurable outcomes are being obtained and, as the graph above suggests, we are on course for dramatic, exponential success in our programs. Elimination of the TCUP program will have dramatic effects on our programs and the ability of our current students who are looking forward to continuing on to graduate programs in the near future.

OGLALA LAKOTA COLLEGE
KYLE, SOUTH DAKOTA
MARCH 2010

Overview of the Oglala Lakota College TCUP Program

By Charles Jason Tinant, jtinant@olc.edu
Dr. Hannan LaGarry, hlagarry@olc.edu
490 Piya Wiconi Road
Kyle, South Dakota 57752

Overview

Oglala Lakota College (OLC) has benefited significantly from the National Science Foundation's TCU program over the last decade. The NSF-TCUP has been instrumental in developing a high quality math and science curriculum at OLC. Through the development of infrastructure and personnel, we have recently begun to develop collaboration opportunities with universities in South Dakota and elsewhere. At present, because the poverty of the Pine Ridge reservation we do not have a tax base to support our institution and, because of the ten year period in which we have had science degree programs, we are not competitive with South Dakota universities. We have major concerns that the proposed changes to TCUP funding will significantly limit our ability to continue to grow our infrastructure and our faculty. The most likely scenario, if the proposed changes were to take place, would be that that OLC would play a subservient role to South Dakota Universities, and the progress we have made in terms of TCU quality and effectiveness would erode over time.

We were asked by AIHEC for the following information: 1) provide a short description of your NSF-TCUP project, 2) discuss any great outcomes that you have experienced, and 3) provide recommendations for changing the current NSF-TCUP so that it better meets your needs, 4) give experiences in applying for grants with NSF outside of the TCU program (NSF-TCUP).

Short Description of our TCUP Projects

We currently have two TCUP projects at OLC, a TCUP Phase I project to develop an infrastructure for Earth Science and Conservation Biology so that we will begin to become competitive in research, and a STEEP project to fund the professional development of new and current K-12 teachers on the Pine Ridge Reservation.

Specifically, our TCUP Phase I project will build capacity in earth science, ecosystem science, chemistry, and the biological sciences through educational opportunities at the MS and PhD level for Tribal College faculty and teaching staff and through developing a data infrastructure to archive and disseminate results from past and current research projects on the Pine Ridge reservation to students, faculty, tribal programs, and other collaborators. This will: 1) strengthen educational and research relationships between a Tribal College, tribal resource programs, and mainstream universities to significantly increase the number of undergraduate students participating in research and service-learning, 2) provide informal science outreach to community members and K-12 schools,

3) develop principal investigators at Tribal Colleges, 4) integrate classroom learning and summer research experiences at OLC, and 5) establish graduate level coursework at a Tribal College through a memorandum of agreement with a mainstream University.

Our STEEP program increases the number of qualified, high quality secondary teachers for Pine Ridge reservation schools. It trains them in effective methodologies and provides additional support in the form of teaching tools, software, and post-graduate professional development opportunities. The program continues to build on our K-12 outreach initiatives, and strengthen our collaborations with schools across the reservations of South Dakota. Over time, the program outcomes will have an impact on over 14,000 schoolchildren in our partner schools, 90% of whom are Native Americans. The ultimate goal is to eliminate the 35 percentage point gap between the SAT9 scores of Native American schoolchildren on the Pine Ridge reservation and their South Dakota counterparts.

Significant Outcomes

The OLC Math and Science department has used NSF funding through MIE and TCUP to develop infrastructure for distance education and research. As an outcome of MIE, greater than 80% percent of our courses are taught using synchronous distance education platforms (pictel) and greater than 40% of our courses use both pictel and internet-based asynchronous distance education. We have also established best practices and institution-wide distance education policies for courses taught in a fully asynchronous setting. Our first TCUP award provided resources to purchase research laboratory equipment including an atomic absorption (AA) flame and furnace, gas chromatograph mass spectrometer (GCMS), portable and benchtop x-ray florescence for elemental analysis, benchtop x-ray diffraction, ion chromatograph, and GIS remote sensing laboratory. A phase II TCUP award provided us with resources to catalyze relationships with tribal agencies. Our tribal partner agencies now see OLC and the Lakota Center for Science and Technology (LCST) as a credible science resource center that can help solve their problems. In 2009, OLC received a second TCUP phase I award to shift our focus from equipment acquisition to data acquisition by retaining our faculty to develop institutional memory, expanding our network of partnerships and collaborations, build community relations, and establish end points for long-term research through the integration of science education and reservation-centered undergraduate research emphasizing that meets the needs of our community members.

Our greatest successes have been our recent graduates. Until recently, our graduates had considered a BS in science as a terminal degree. However, as an outcome of TCUP funding, our recent graduates are enrolling in graduate school. These students are all first generation college students from poor families on the reservation. Many of these students had initially failed out of mainstream schools before attending OLC. Through TCUP, we have been able to mentor these students in a hybrid research and education

program that has allowed them to develop professional skills and be competitive at a graduate school level.

Experiences in Writing Outside of NSF TCUP

We have been successful in being funded from outside of the Human Resources Directorate (HRD) two phases of a single project – the Lakota Land Project (details are given below), however we have not been successful with any other proposals. There are several reasons we have been unsuccessful over the last decade in having research funded by other NSF directives: 1) Tribal Colleges are primarily teaching colleges, and our faculty traditionally has not had release time to develop research projects, 2) the majority of our faculty is at the BS and MS levels and thus does not have research experience to be competitive, 3) NSF research proposals typically require hypothesis testing of baseline data, which does not currently exist for the Pine Ridge reservation.

GEO-0503612, $55134 7/15/2005-6/31/2006 (PI Dr. Sylvio Mannel). Lakota Land Mapping, culture, history, and recreation. In this pilot project we locate Lakota historical, cultural and recreational areas. Lakota Land includes establishing a geodatabase, setting up an online interactive map, supporting the formation of a committee to handle sensitive sites, and investigating links of Native sites with geospatial features.

GEO-0703813, $100,000 9/01/2007-8/31/2009 (estimated) (PI Dr. Gerald Giraud). Lakota Land 2 - Sharing Lakota History. This is a continuation of the NSF funded Lakota Land Project, which had students of the Oglala Sioux Tribe use modern GPS and GIS tools to map culturally important sites of the Pine Ridge Reservation. This continuation project focuses on sharing the mapping activities and historical information with partners and/or institutional participants, such as Alliance of Tribal Tourism Advocates (ATTA) and Oglala Lakota College's (OLC) TV Production Program, local youth organizations and other geospatial data users.

Recommendations

We feel the existing TCUP program (e.g the program as it existed prior to the proposed budget) well meets our needs. In terms of other NSF directorates, new programs targeted for undergraduate research and education would be areas that TCUs could become competitive in. These types of programs are needed if TCUs are to be successful outside of the NSF's HRD directorate.

AIHEC

Mini-Symposium – 2008 Report
Broadening Participation of Native Americans in Science and Engineering: Lessons Learned

A report submitted to the Committee on Equal Opportunities in Science and Engineering
by
Dr. Marigold Linton, CEOSE Member

October 29, 2008

The Mini-Symposium on broadening participation of Native Americans in science and engineering was held on October 29, 2008, at the National Science Foundation. It was designed to highlight strategies that increase the number of Native Americans in science and engineering. This activity was co-sponsored by the Committee on Equal Opportunities in Science and Engineering (CEOSE) and the National Science Foundation (NSF) Centers Forum, and it has assistance from The Mississippi eCenter in its development. It was well attended.

The goals were:

- To identify lessons learned and persistent barriers to broadening participation in science and engineering by Native Americans;
- To share ideas and experiences of leaders in the community, as well as those of officials at selected Federal agencies, on broadening the participation of Native Americans in science and engineering;
- To make recommendations to CEOSE on what actions it could take that would best propel the science and engineering agenda forward for Native Americans; and
- To make recommendations to CEOSE and to funding agencies (including NSF) on ideas for policies and programs that will cause institutions to choose to make changes, which taken together will transform the science and engineering enterprise to become much more welcoming, supportive, inclusive, enabling, and advancing of Native Americans who are traditionally underrepresented in science and engineering (and obtain the data to demonstrate this progress).

Dr. Wesley L. Harris, CEOSE Chair, set the tone for the mini-symposium and **Dr. Kathie Olsen**, NSF Deputy Director, welcomed everyone. **Dr. Margaret E. M. Tolbert**, the CEOSE Executive Liaison, discussed the format for the meeting and introduced the persons responsible of providing background information on the three main speakers.

Designated discussants enthusiastically participated in the deliberations on the topic of the mini-symposium, following presentations by the three main speakers whose names and presentation titles follow:

Where Are We and Why Aren't We There Yet?
Ms. Holly Pellerin
Coordinator
Earth, Water and Wildlife Track
National Center for Earth-surface Dynamics (NCED)
Fond du Lac Tribal and Community College
and

Tribal Elder, Fond du Lac Band of the Ojibwe

Tribal Indigenous Knowledge: The Science, Technology and Tribal Interface at CMOP
Mr. Roy Sampsel
Board Member, Institute for Tribal Government, Portland State University
Chairman, External Advisory Board, Center for Coastal Margin Observation and Prediction

Alaska Native Science & Engineering Program (ANSEP), Building a National Model for Excellence in Native American Higher Education Programs
Dr. Herb Schroeder
Associate Dean and Professor of Engineering
University of Alaska-Anchorage, School of Engineering
Executive Director, LSAMP Pacific Alliance
Executive Director, Indigenous Alliance for Engineering & Science Education
Executive Director, Alaska Native Science & Engineering Program (ANSEP)

The above three speakers were introduced by **Dr. Dragana Brzakovic** of NSF, **Dr. Marigold Linton** of CEOSE, and **Dr. Joan Frye** of NSF, respectively.

Dr. David R. Burgess, a former CEOSE member who currently serves as Professor of Biology at Boston College and as a Board member of SACNAS, kicked off the discussion session with the presentation of data and questions that stimulated thought and focused the deliberations.

Recommendations that resulted from the mini-symposium provided by individual discussants who participated in the roundtable discussion are as follows:

- **Ms. Carrie L. Billy**, J.D., President & CEO, AIHEC:
  - Provide SIGNIFICANT resources over a sustained time frame – (longer term grants i.e., 10 years)
  - Provide Access to best practices – widely disseminated and used by grantees and potential grantees.
  - Develop and implement Co-equal partnerships across NSF, addressing, and including all areas, including climate change/geo-sciences education and research.

  * NSF should focus on improving and expanding access to its programs—lead other agencies by example, not by trying to force collaboration. You will just get bogged down in meetings. We need action!
  * We need a TCU EPSCoR!

- **Dr. David R. Burgess**, Professor of Biology, Boston College; SACNAS Board Member:
  - A new program should be created to support the efforts of the colleges and universities graduating large numbers of American Indian/Native American science B.S. students.
  - In states that do not have Tribal Colleges, create new pre-college programs for colleges with large enrollments of American Indian/Native American students.

- **Dr. Diana Dalbotten**, Diversity Director, NCED/University of Minnesota – Twin Cities
  - Support the formation and sustenance of AISES chapters (and SACNAS) at universities, Tribal Colleges, high schools, etc. These matter to the students,

who get more support (social, psychological) there than any where else if the chapter is strong.
- Find out how often lack of scholarships and other funding leads to school dropouts from STEM programs. I know this has been the case with many STEM juniors or seniors that I know.
- Find a way to include non-academics (program managers, teachers, parents, elders) in the new development of new NSF programs, and on programs panel.

We need better research on promoting math (best practices) with Native Americans, but emphasis on control groups and number only hampers this research - how do you get reliable numbers with small groups and informal programs?

- **Dr. Anselm G. Davis**, Executive Director, White House Initiative on Tribal Colleges and Universities:
  - Find ways to ensure that everyone working with American Indians understand the history of education in the life of Indians and make adjustments.
  - Continue to provide resources in the hands of Indian people, which will help self-determination effort.
  - Research the Rural Systemic Initiative, and duplicate it.

- **Dr. Willard Sakiestemwa Gilbert** – Professor, College Education, Northern Arizona University:
  - Seek collaborative efforts with national Indian organizations to help set the agenda for the STEM initiative at the National Indian Education Association. The National Congress of the American Indians and the American Indians Science and Engineering Society have already started this discussion.
  - Find more programs that address the issues of providing STEM programs at the elementary level that targets the integration of traditional language and culture (i.e. traditions, stories, values, language, and indigenous ways of knowing) into the existing science curriculum from K-12.
  - Providing funding a program for professional development in areas of teacher training in how to teach science and how to develop native cultural knowledge based on cultural – based curriculum.

- **Dr. Gerald Gipp**, Former NSF Program Officer & Former AIHEC:
  - The NSF Director should create an American Indian Initiative, which cuts across all Directorates.

    Mandates

    1a. Each Directorate should assess its current contributions to promoting pre-k-12 education and post-secondary education for American Indians.

    1b. Each Directorate should consider changes in their program authority to increase service to American Indian education.
  - NSF should take a lead role to advocate for coordination with other federal agencies to create real partnerships (pre-k-12 – HE).

- **Dr. Marigold Linton**, Director American Indian Outreach, University of Kansas
  - Think of ways to improve grant writing and review.
    - ✓ Grant proposals are too often rejected on technical grounds rather than on the quality of the ideas.

- ✓ The number of Native reviewers should be increased – both scientists and participants.

- **Dr. J.V. Martinez**, Senior Advisor, Scientific Institutional Outreach, Office of Science/US Department of Energy:
  - Fund a sociology-based study to understand the social content re: STEM education in Indian country;
  - Re-institute Rural Systemic Initiative directed to TCU;
  - Conduct a study to evaluate infrastructure in TCU that hinders STEM education.
  - Catalog the more successful STEM education experience in TCU.

- **Dr. William E. McHenry**, Executive Director, The Mississippi eCenter/Jackson State University:
  - Provide a forum (on-line) to continue the discussion, which was begun with this mini-symposium.
  - Use technology to link Tribal Colleges with NSF funded projects to encourage transfer and BS Degree completion.
  - Link TCUP & LSAMP with STCs and other large Center programs at NSF to encourage – where possible – infrastructure development.

- **Dr. Gerald E. (Carty) Monette**, Senior Advisor, Quality Education for Minorities Network, Inc.:
  - Professional Development
    - ✓ TCU faculty
    - ✓ K-12 faculty

    Focused on STEM Instructional Improvement, and for TCU STEM faculty include research opportunities for undergraduate (STEM Learning).
  - Teacher Education
  - Use the TCUP as a vehicle for collaboration and partnership ventures with NSF among Directorates.
  - Climate change initiatives, instruction, and research.
  - Application of Technology to improve STEM instruction and research.
  - Provide project specific evaluations on Tribal College and University campuses; however, be sure that those who are conducting those evaluations are familiar with the Tribal Colleges and Universities.
  - Develop the evaluation capabilities of more Native Americans who can evaluate NSF projects.

- **Dr. Holly Pellerin**, Tribal Elder & Coordinator for Earth, Water and Wildlife Track of NCED, Fond du Lac Band of the Ojibwe:
  - Let us write what we need for STEM advancement and try to work with us to fill our needs, and it will fill our needs as people of our Earth. Include STEM.
  - Don't make us quibble over money or compete with other Indians.
  - Do what you mean for American Indians. Participation as real partners – not just "add ins".

- **Dr. Carl S. Person**, Manager, Minority University Research and Education Programs, Office of Education, NASA Headquarters:

- Recommend NSF consider a program designed to place scientists and engineers from across the country at TCUs. Individuals could spend up to two years conducting research and/or teaching at the Tribal Colleges.
- Recommend NSF take the lead in developing, planning, and implementing a crosscutting Federal Agency program focusing on internship and externship in which Federal representatives spend the summer in Indian country. Representatives from Federal Agencies would serve as mentors for cohorts of student and faculty teams involved in hands-on research. The goal is to involve them in research that they can continue their campuses with on-going connections to the visiting scientists or engineers.

- **Dr. Patricia Petite**, President, Fond du Lac Tribal College:
  - Community Outreach
    - ✓ Families – partnership
    - ✓ Schools P-12
    - ✓ Tutors - family nights (math and science)
  - Teacher Training
    - ✓ Re-train
    - ✓ Curriculum
  - Flexible Requirements
    - ✓ One size doesn't fit all.
    - ✓ Resources

- **Dr. Clifton A. Poodry**, Director, Minority Opportunities in Research Division, NIGMS/NIH:
  - Continue to gather data on the nature of the problem.
    Less than 50% American Indians graduate from high school.
    Half live on reservations.
    Are the high school and college graduates going rates different for reservation versus non-reservation Indians?
  - Is success over reported? Because identity is self-identified. Being an American Indian is not a race/ethnicity but a tribal affiliation – which varies by tribe.
  - The RSI clearly had an impact on K-12 and may be worth reviving.
  - Work with and through professional societies (e.g., SACNAS and AISES).
  - A very successful project for American Indian graduate students is the Sloan Program at the University of AZ. Form a partnership, and expand it.
  - Look to form a partnership with HHMI in its educational program. The Phage Discovery Project could easily be extended to TCU and to high school students.

    The concept of multi-generational grief is extremely important. Many families have several generations who have been failed by education systems. The effects of the boarding school days have been inherited and pass on to containing poor outcomes.

- **Dr. Paul E. Racette**, Co-Vice Chair, Goddard's Native American Advisory Committee, NASA Goddard Space Flight Center:
  - Establish guest faculty program at TCUs that draw professionals from government, industry, and academia. Benefits include:
    - ✓ Two way exchange,
    - ✓ Faculty relief,
    - ✓ Curriculum enrichment,

        - ✓ Grant writing, and
        - ✓ Increased understanding of cultural differences and strengths.
    - o Foster partnership between Native American communities, institutions, and faculty and government and industry. Foster partnering between federal agencies.
    - o Access the effectiveness of minority programs in reaching Native American institutions and students. Biases exist in the application, selection, and evaluation processes.

- **Mr. Roy Sampsel**, Chairman, External Advisory Board, CMOP/Oregon Health and Science University; Board Member, Institute for Tribal Government/PSU:
    - o NSF should help other Federal agencies understand what the needs are in SET education and report to congress on the need for resources.
    - o Develop long term funding that would be in the timeframe of five to ten years.
    - o Understanding how complex the Indians/tribal world is so that NSF can address the full range of issues.

- **Dr. James Wyche**, Director, Human Resources Development Division/EHR/NSF:
    - o Integrate the culture of native people with STEM education via NSF programmatic activities.
    - o To improve sustainability, NSF should provide a minimum published time frame in which a teacher ed., student, or related preparation activities are supported.
    - o Use best practice(s) of RSI to "re-model" a TCUP STEM activity to improve teacher/student education in native and tribal colleges.

- **Ms. Sara L. Young**, Director, American Indian Research Opportunities, Montana State University:
    - o Continue dialogue with Native American programs and community leaders to create new programs that NSF can support in Indian country.
    - o Strengthen the broadening participation requirements in all NSF funded projects – outside of the EHR divisions.
    - o Provide incentives for STEM teachers and faculty to serve in reservation K-12 schools and tribal colleges who are struggling to hire STEM teachers and faculty.

Following remarks by **Dr. W. Lance Haworth**, Director of the Office of Integrative Activities of NSF, **Dr. Harris** advised that the above recommendations would be summarized for review and approval by members of CEOSE. The resulting summarized list of recommendations will be submitted by CEOSE to the NSF Director for action.