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## NASE NE Space Grant / EPSCOR Native American Outreach: Tracing a Successful NASA / Tribal Partnership

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# **NASA NE SPACE GRANT/EPSCOR NATIVE AMERICAN OUTREACH: TRACING A SUCCESSFUL NASA/TRIBAL PARTNERSHIP**

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## **ABSTRACT**

The involvement of the NASA Nebraska Space Grant (NNSG) with the Native American community began over 4 2 years ago. Primary participants have included faculty and researchers from the University of Nebraska at Omaha (UNO); administration, faculty, and staff of 4 Nebraska reservations schools and 2 tribal colleges, and close to 1,000 Native American youngsters. Over these past years, numerous activities and projects have been undertaken; all have been exceedingly successful. Included among these programs and initiatives are educational, motivational, and infrastructure-building activities.

## **INTRODUCTION**

The NNSG and EPSCoR has a rich tradition of reaching out to the state's Native American educational community, particularly in the areas of improving the mathematics, science, and technology. Such an initiative finds its philosophical underpinnings in not only NASA's desire to aid such indigenous populations but in the NNSG's efforts to serve the same population for the same reasons. To further this effort, numerous activities to enhance the viability of the program have been funded.

The first involvement of NNSG and EPSCoR with the Native American community in general occurred in Rapid City, SD in October 1996 when NASA researchers at UNO, as well as from other mid-western states, were invited to address college presidents at the American Indian Higher Education Consortium (AIHEC). It was during these presentations that the NNSG representatives envisioned a need to interface and build a stronger relationship between Nebraska's two tribal colleges, Little Priest Tribal College and Nebraska Indian Community College, and UNO. The outreach initiative was quickly conceived and the initial focus was on educational partnerships, enhancement grants, and infrastructure building.

However, one clearly identifiable barrier in completing future projects though is that over the past several decades, the Nebraska Native American population on the state's reservations has been plagued by un-employment (running as high as 75% on some reservations) and extremely dismal family situations. As a result and as might be expected, school age children often have difficulty in meeting minimum academic standards or even staying in school until graduation. Consequently, a very small number of students graduate from secondary schools and an even smaller number attends higher education. A major focus of this initiative is use of NASA Science to

reverse this trend.

## THE THREE PROGRAMMATIC PILLARS

The need to develop the envisioned program of outreach focuses on three specific areas: infrastructure building, curriculum enhancement, and student motivation. In fact, so strong was the belief that these three areas were the foundation for any future outreach endeavor, they became known as the three programmatic pillars. The following section=s discussion with center on them.

### **Infrastructure Building**

The meaning of infrastructure building in the case of this endeavor is the ability to be able to identify and utilize the underlying network of people, processes, and organization(s) that make up the Native American community. This infrastructure is viewed as not being limited by the state boundaries of Nebraska but includes neighboring states and the region as well. The reason for this definition is that many of the tribes in one state are closely linked to other related tribes in another state.

**Nebraska Native American Working Group.** The Nebraska Native American Working Group (NNAWG) was formed on February 25 and 26, 1997 at the University of Nebraska at Omaha. Participants met at the UNO Alumni Center and toured the UNO campus on the 26<sup>th</sup>. Persons attending included: President Yvonne Bushyhead - Little Priest Tribal College (LPTC); President Shuler Houser - Nebraska Indian CC (NICC); Superintendent Chuck Squier - Santee Public Schools; Superintendent Virgil Likness - Winnebago Public Schools; and Professor Hank Lehrer, Professor Brent Bowen, Micheala Schaaf, Professor Don Dendinger, and Associate Dean JoAnne Lofton all of University of Nebraska at Omaha.

Items discussed included: Tribal School/UNO future educational partnerships; joint research and grant writing opportunities; scholarship opportunities and funding mechanisms; curriculum development for improving K - 12 mathematics, science, and technology education through the use of aeronautics; faculty enhancement workshops; development of a Nebraska Model of Best Practice; and future interstate, regional, and national Native American/NASA Space Grant initiatives. As a result of this meeting, a number of annual scholarships and organizational enhancements were provided to the tribal colleges and the reservations schools. The working group meet several times within the next few years and continues to maintain close contact with other members. Interestingly, it was not until this first UNO meeting that many of the administrators had ever met jointly to discuss pressing problems and possible partnerships.

**Other Activities.** In addition to the formation of the NNAWG above, there were numerous activities to build the infrastructure between NNSG and EPSCoR and the Native American (NA) community. These activities focused not only of Nebraska but on the neighboring state of South Dakota which has a large American Indian population.

A one-day grant writing workshop for faculty and staff at NA schools and college was held in Norfolk, NE in August of 1997. This location was selected because it is

central to the reservations. A total of 48 people attended and all tribes and institutions were represented. The main topics for the day were how to prepare research and funding proposals in response to requests for proposals from various agencies. A small travel stipend was furnished to each attendee. In a post-workshop evaluation, attendees overwhelmingly indicated that they now had the skills to complete a response to a request for a grant proposal.

Two key activities have been developed with the state of South Dakota Space Grant. The first was the signing of a Memorandum of Understanding (MOU) between the Directors of the Nebraska and South Dakota program. The MOU stated that both programs would begin:

1. Engaging in faculty interaction and the enhancing of curricular development activities focused on improving mathematics, science, and technology educational opportunities for Native Americans.
2. Exploring joint research and collaborative opportunities.
3. Expanding student scholarship opportunities and funding mechanisms in aeronautics, space, and related fields.
4. Moving jointly to encourage, at our respective institutions, expanded upper administrative level involvement in this initiative.
- 5.

The other activity was several joint meetings to discuss and plan joint bi-state activities. However, this partnership has not been fully developed and realized. Discussions do continue with the respective directors of both programs.

One successful endeavor that has been fruitful was the support given by the NNSG and EPSCoR for the preparation by the Journalism classes at South Dakota State University of a Tabloid on Tribal Schools that highlighted actual programs in place at schools in Nebraska and South Dakota. Interviews and stories about the South Dakota as well as the Nebraska Native American Schools were included. The Nebraska support of this effort was a one-time funding grant.

### **Curriculum Enhancement**

The first active involvement of the NNSG and EPSCoR with reservations schools and the tribal colleges intended to enhance the science and mathematics curriculum was during the summer of 1998. Four teachers, one at each school and one from the two tribal colleges were awarded \$200 mini-grants to attend the Aerospace in the Curriculum Teacher Workshop that will be held at Augustana College in Sioux Fall, SD from June 22 - 26, 1998. The award was used to cover any of the expenses that were associated with the workshop.

During the intensive 5 days session, sponsored by the SD Space Grant, attendees worked on numerous activities that were appropriate for elementary and secondary school children. In addition, classroom materials were made available to

distribution to schools and students.

**NASA Ames Rural Workshop 1999.** A more recent curriculum enhancement activity was to send four elementary teachers of Native American children to a two-week workshop at NASA Ames during the summer of 1999. Each of the four reservation schools in the state (Omaha Nation, Winnebago, Walthill, and Santee) were represented by an elementary school faculty member. During the workshop the team members visited research and applied science facilities at the installation, collected and reviewed educational materials for their classes back the home school, and worked with colleagues on group projects. One major product from the workshop was a Nebraska Action Plan.

**NASA Ames Rural Workshop 2001.** In February 2001, NASA educational officials asked that another Nebraska team be selected and sent to NASA Ames for the 2001 workshop. Again, four teachers were selected, one from each of the schools. However, this year, junior high and high school teachers will be on the team. A team meeting is planned for early June at which time the new members and past team members will meet and plan how to best continue the integration of NASA Science within the existing curriculum of the reservation.

## **Student Motivation**

**Aeronautics Days.** An overwhelmingly successful endeavor has been the NASA Aeronautics Day at the Sioux City, IA Airport. Begun in 1997, the thrust has been to familiarize students at the Nebraska reservations schools with aeronautics in general and the application of scientific activities in an aviation setting specifically. Since the program began, close to 700 5<sup>th</sup> grade students have spent a day at the airport viewing military and general aviation operations. One central theme that runs through the day=s activities is that it is critical to stay in school, do well in the sciences, and avoid any involvement in drugs or alcohol. These projects have been extremely successful but have been aimed solely at the schools, teachers, and students; the main focus is to highlight the aviation and aerospace as possible career options and compelling reasons for students to stay in school. Another Aeronautics Day is planned for September 2001.

**ACE Academy.** The Aviation Career Exploration (ACE) Academy is a one-week summer aviation education program for high school students, co-sponsored by the Federal Aviation administration (FAA) and a host educational institution, in this case UNO. The program is designed to provide students with a wide range of aviation career exploration experiences. Focus is on aviation career clusters identified by FAA, with emphasis on opportunities for women and minorities. In 1997 and 1998, two youngsters from the Winnebago and Santee Sioux reservation attended. The impact on these young people of a total immersion in aviation for a week with many other people of their own age, in and of itself, was immense. After the second group attended, the superintendent of the youngsters= school informed the NNSG that Anever has there

been as much of a change in these two young men as when they returned from spending a week at the UNO ACE Academy.@

## **FAMILY SCIENCE**

Family Science is a program designed to involve families working together on several different hands-on activities during evening meetings at school. Sometimes special demonstrations and guest speakers are included in the programs. Also, ideas are given to parents on how to do possible experiments and projects at home with their children. These activities can be done using materials readily available in most homes or supplied by the school. Hopefully, as a result of the Family Science programs, parents and students will realize that science can be fun.

The purpose of this program is not to make parents into scientists or the primary teacher of their child, but to provide an opportunity for families to work together in an interesting and enjoyable manner. Of course, by doing such activities, it will become more apparent that science is not only for school, but that it is related to the real, everyday lives of everyone. Needless to say, doing such activities provides additional time for the learning of science and enhances student learning skills.

### **The Nebraska Concept**

The Families United in the Discovery (FUN) of Science project that was initially envisioned would involve selected students and their teachers. The target group was upper elementary children approximately 11- 12 years of age and the specific population was students in the Santee Community Schools in Niobrara, NE. The project included the parents and family of those children and faculty of the school and researchers of the NNSG.

### **Demonstration Project**

A demonstration project was carried out at the Santee Community from September 2000 to April 2001. This project involved a teaching paradigm which called for students and teachers to cover several appropriate parts of an aeronautical science the unit at school, the students would complete more of the unit after school hours with the family members, and there would be bi-monthly Family Fun Nights at the school.

The science night included an evening meal plus combination of science demonstrations by NICC and UNO faculty, directed group activities, and fellowship. The underlying goal was the continued improvement of mathematics and science skills among these Native American youngsters through involvement of the family unit.

In the four Family Fun Nights that were scheduled for the 2000-2001 school year, almost 300 parents, staff, faculty, and students participated. The program at

Santee will be funded for the next year and a one-time demonstration project is planned for Winnebago and Walthill Schools for the 2001-2002 school year.

## **RESEARCH PROJECTS**

The integration of the Native American Outreach with the research being conducted by other NASA Nebraska EPSCoR clusters and min-clusters is a high priority. There are three specific areas of interface planned: Airborne Remote Sensing, Aircraft Propulsion Systems, and Small Airplane Transportation Systems (SATS). Although the pure research being done in these three areas may initially be beyond direct application to Family Science, there are however, many tangential relationships that are fertile for cultivation. Specifically, numerous opportunities exist for the development of summer fellowships for Native American educators at all levels, the establishment of co-operative research efforts at tribal colleges, and the integration of NASA science from these research areas into various Family Science modules.

### **Small Aircraft Transportation System (SATS)**

The NNSG and EPSCoR has been a major participant in NASA's SATS program. However, an additional dimension of the Nebraska SATS program has been the development of a focus that includes the vast reservation lands in the state as possible airport sites. This focus is an attempt to provide a much needed transportation link to off-reservation areas from tribal locations and a linkage of far flung reservations with major airport hubs. It has been critical to include extensive SATS information in the Family Science program because the young students that are today on reservations will be the next generation of possible aviation consumers. Specifically, future SATS efforts will include any or all of the following: faculty outreach grants, institutional enhancement grants, workshops for teachers, and sponsored field trips for students,

### **Missouri River Remote Sensing (MORRES)**

A new endeavor and exciting partnership in the planning stage is Missouri River Remote Sensing (MORRES), a joint research effort between NNSG and tribal governments in the Missouri River basin. Through the use of state-of-the-art NASA data by tribal environmental officials and NNSG researchers, it is hoped that more productive use of reservation lands will be realized.

A vast portion of tribal reservations in the Upper Missouri River Valley consist of farming and grazing lands. In many cases, a good portion of this land is not as productive in number of bushels of grain/product harvested or head of cattle/buffalo sustained. While there are a variety of reasons for this deficiency, it seems very logical that the regular and routine use of geospatial information by this project can greatly enhance these yields. In the past though, such data were not available to tribal governments for their use.

It is also envisioned that both satellite and aerial remote sensing information can be used to develop better range management, water quality, and land management as well. Specifically, areas of assistance to tribes will be in the form of dissemination of data on soil interpretation, root/zone available water holding capacity, potential corn and soybean yields, and hydrological soil group specifics.

The mechanism for the utilization of these data will involve specialists at both the universities involved and on each participating reservation. A geospatial specialist hired for this project will be housed at the University of Nebraska at Omaha (UNO). The specialist will work closely with remote geospatial decision support experts already in place at both UNO and at the University of Nebraska at Lincoln (UNL). A key responsibility for this person will be to travel to participating tribal locations and train and assist local environmental team members.

The funding of a tribal geospatial specialist is also an integral part of the project and there must be one such individual on each participating reservation. This individual may already be in place on several reservations and already acting as an environmental specialist. However, it is believed that the tribal specialist may need to be trained in the use of remote sensing data; such training is a key component of the initiative. The tribal geospatial specialist will work directly with the tribal government on utilization and dissemination of the remote sensing data. It is anticipated that more productive use of reservation land and water, through the joint efforts of NNSG and participating tribal governments, will result.

## **LESSONS LEARNED**

Numerous lessons have been learned during the last 4 2 years of this NNSG outreach program. Most of them have been based on simple common sense and courtesy being displayed at all time. Others have been a result of being on the reservation and interacting with tribal members as well as school administrators, faculty, and staff.

Perhaps the most important of these lessons is that visitors must remember that they are guests on the reservation. Being friendly but not too familiar initially is a key behavioral mode. There is a great deal of suspicion among tribal members toward non-Native American; this suspicion is for many reasons, some rooted in fact and others in fiction. That being the case, the best personal deportment is to be a well-mannered visitor. In turn, tribal members, particularly the children, warm quickly to friendly, sincere non-Native American visitors.

Closely associated with the personal stance outlined above is the assumption that you will go to the reservation particularly on making initial contact. To stay in one's office and try to develop a relationship with tribal members will not work; you must be Aon the res@ to make any meaningful, long-term progress in developing relationships.



As projects and partnerships, develop you can begin to utilize more long-distance techniques.

A final key point in effectively dealing with tribal and reservation educational officials is that an attitude of Athis is what I want you to do@ will not work. A successful non-Native American operating on tribal lands must initially use an approach of Awhat can I do to help you with this problem.@ Or Awhat problems do you have and how can I help you with them.@ Tribal officials are very resourceful and highly motivated individuals and should be treated as such; view these persons as long-term partners in any endeavor and you will be much more likely to be successful.

### **FUTURE DIRECTIONS**

In reflectively reviewing the progress that has been made during the 4 2 years of this outreach program, it is clear that a great deal of headway has been made. The progress though is moving more slowly than many would wish. A casual factor for this reduced rate is that the entire infrastructure needed to be built and a conscience effort was made to build from the bottom up rather than the top down. Such an approach is much slower but is inherently more solid when completed.

There is no question that the curriculum and motivation of students has become very vital. NASA research in science and mathematics is slowly finding its way into classroom; students that are experiencing this aeronautics-based approach to mathematics and science seem eager for more. In several instances, a marked improvement in grades and achievement has been found in several of the students that are part of the Santee Family Science program. Although the number of students affected is still small, a great deal of positive is feedback is coming from parents and teachers alike. More summative evaluation is planned for future activities.

The future of the research initiatives mentioned above looks bright and the chance to be involved on a more tribal level is encouraging. The possibility for significant interaction with the South Dakota Space Grant and other agencies will elevate the NNSG and EPSCoR Native American Outreach to a new plateau.

### **RELATED PAPERS/PRESENTATIONS**

1. Bowen, B., & Lehrer, H.R. AOpportunities for Tribal Colleges through NASA Space Grant Funding.@ American Indian Higher Education Consortium, October 1996, Rapid City, SD.
2. Lehrer, H. R. (1996). AA Nebraska Space Grant/EPSCoR Aeronautics Initiative: An Articulation Model with Tribal Colleges.@ Western Region Space Grant Meeting, Santa Fe, NM, November 1996
3. Lehrer, H.R. (2000). AArticulation Between UNOAI and the Nebraska Native American Educational Community: An Exciting And Fulfilling Adventure.@

National Indian Impacted Schools Association Conference, Omaha, NE, June 2000.

4. Lehrer, H.R., & Zendajas, E. AA Family Science Demonstration Project@ Nebraska Academy of Science, April 2001, Lincoln, NE.
5. Lehrer, H.R., & Zendajas, E. ANASA NE Space Grant/EPSCoR Native American Outreach: Tracing a Successful NASA/Tribal Partnership.@ Western Region Space Grant Meeting, Warm Springs, OR, October 2001.

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