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## Consensus Building in Native American Outreach: A Process Plan for Consensus Building in the Evaluation of the NSGC Native American Outreach Program

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A Process Plan for Consensus Building in the  
Evaluation of the NSGC Native American Outreach Program

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## Abstract

The NASA Nebraska Space Grant (NSGC) & EPSCoR Programs at the University of Nebraska at Omaha have embarked on a unique educational journey. This journey, known as the Native American Outreach program has been a highly successful endeavor since its inception five years ago. The Native American Outreach Program's main objective is to make Native American students more competitive in mathematics and science. This program is the most comprehensive Native American program of any state and has allowed for a variety of activities to take place including: regional and national presentations; interfacing between schools; and formulating administrative leadership conferences. In order to continually provide effective support to Nebraska's Native American community, NSGC & EPSCoR sought an evaluation technique for the Native American Outreach Program. To execute such an evaluation, the NSGC organized the first Nebraska Aeronautics Education Summit (NAES) Meeting. The diverse group of educators, researchers, and practitioners present at the summit provided a unique opportunity to gather information by employing a focus group research technique. This opportunity was not only beneficial to the Native American Outreach program by assessing its strengths and weaknesses, but also to those who participated in the study by providing them with a worthwhile learning experience. The results and recommendations acquired and included in this document were indeed remarkable. The utilization of the summit participants' recommendations and innovative future plans will ensure continued shared success between NSGC & EPSCoR and the Nebraska Native American community.

## A Process Plan for Consensus Building in the Evaluation of the NSGC Native American Outreach Program

### Introduction

The NASA Nebraska Space Grant (NSGC) & Experimental Program to Stimulate Competitive Research (EPSCoR) Programs at the University of Nebraska at Omaha have embarked on a unique educational journey. This journey, known as the Native American Outreach program has been a highly successful endeavor since its inception five years ago. The NSGC and EPSCoR programs have a rich tradition of reaching out to Nebraska'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 NSGC'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 NSGC and EPSCoR with the Native American community occurred in Rapid City, South Dakota in October 1996 when NASA researchers from NSGC were invited to address college presidents at the American Indian Higher Education Consortium (AIHEC). It was during these presentations that it was seen that a need existed to interface and build a stronger relationship between Nebraska's two tribal colleges, Little Priest Tribal College and Nebraska Indian Community College, and the University of Nebraska at Omaha. The outreach initiative was quickly conceived and the initial focus was on educational partnerships, enhancement grants, and infrastructure building (Lehrer, 1996).

### Utilizing the Qualitative Research Framework

The NNAOP researchers utilized a qualitative research framework to ensure that their study would produce the most appropriate and meaningful information possible. According to Bruce L. Berg (2001), "Qualitative research . . . refers to the meanings, concepts, definitions, characteristics, metaphors, symbols, and descriptions of things" (p. 3). The more human and social characteristics of a society can be defined and determined through this type of research. "Qualitative research properly seeks answers to questions by examining various social settings and the individuals who inhabit these settings" (Berg, 2002, p. 6). Qualitative researchers focus on the human aspects of living in and with their environment.

"The researcher builds a complex, holistic picture, analyzes words, reports detailed views of informants, and conducts the study in a natural setting" (Creswell, 1998, p. 15). Therefore, qualitative research attempts to define more clearly and more deeply the humanistic levels of society by utilizing a multi-dimensional approach. "Quantitative researchers work with a few variables and many cases, whereas qualitative researchers rely on a few cases and many variables: (Creswell, 1998, p. 15-16).

### *Why Qualitative Research?*

“To undertake qualitative research requires a strong commitment to study a problem and demands time and resources” (Creswell, 1998, p. 16). According to John W. Creswell (1998), a qualitative researcher must be willing to do the following:

- Commit to extensive time in the field,
- Engage in complex, time-consuming data analysis,
- Write long passages, and
- Participate in research that has no firm guidelines

(p. 16-17)

However, if a researcher can achieve these tasks, they will be able to explore a variety of humanly important topics by obtaining a detailed view of the individuals involved. Qualitative research allows the academic world to focus on “emotions, motivations, symbols and their meaning, empathy, and other subjective aspects associated with naturally evolving lives of individuals and groups” that are being studied (Berg, 2002, p. 10-11). “Qualitative strategies serve [a] positive-science ideal by providing rigorous, reliable, and verifiably large aggregates of data and the statistical testing of empirical hypotheses” (Berg, 2002, p. 10).

However, a complimentary balance of both qualitative and quantitative research within one study allows for hidden and unanticipated issues to emerge. “Furthermore, when results from quantitative and qualitative methods converge in identifying similar perceptions and attitudes, the findings may be viewed with greater confidence” (Morrow, Burris-Kitchen, & Der-Karabetian, 2000, p. 593).

### *Designing Qualitative Research*

The initiation of qualitative research does not differ from other forms of investigation. All research begins with an idea. However, Berg (2001) offers three models for constructing qualitative research. The first is the theory-before-research model (Nachmias & Nachmias, 1992, p. 46; quoted in Berg p. 17), which “suggests that [a researcher] begins with ideas . . . and then attempts to disprove or refute them through tests of empirical research” (Popper, 1968; quoted in Berg, 2001, p. 17). The second model is the research-before-theory model (Merton, 1968, p. 103; quoted in Berg, p. 18), which states “research may suggest new problems for theory, require theoretical innovation, refine existing theories, or serve to vary past theoretical assumptions” (Berg, 2001, p. 18). The final model is termed the spiraling approach, which is a composite of the above two (Berg, 2001). The spiraling approach allows the researcher to “being with an idea, gather theoretical information, reconsider and refine ideas, examine possible designs, . . . and refine theoretical assumptions . . . and ideas” (Berg, 2002, p. 18).

Once a research model has been chosen, the researcher must focus on the importance of developing a study that is concretely understandable. In order to ensure that the researcher is not misinterpreted during the explanation of their investigation, attention must be directed toward the specific definitions of terms within the study. “This process is called operationally defining a concept” (Berg, 2001, p. 26). However, once a concept is defined, it must be measured within the content of the study to determine appropriateness. “Qualitative investigators . . . need

agreement over what a concept means in a given study and how that concept is to be identified and examined” (Berg, 2001, p. 26).

### *Utilizing a Comprehensive Qualitative Strategy*

The seven primary ways in which qualitative data should be collected are: “interviewing, focus groups, ethnography, sociometry, unobtrusive measures, historiography, and case studies. Each method . . . reveals slightly different facets of the same symbolic reality” (Berg, 2001, p. 4). However, researchers often utilize only the tool with which they are most comfortable. In order to obtain a more complete and more substantive set of data, Berg suggests researchers use the Triangulation Method of research. This method “includes multiple data-collection procedures, multiple theoretical perspectives, and/or multiple analysis techniques” (Berg, 2001, p. 6), which increases the depth of the investigation and attributes to reliability of data and validity of study.

Creswell also offers suggestions regarding the use of the qualitative research technique. He presents eight “characteristics of a ‘good’ qualitative study” (1998, p. 20-21). Those include:

- Employing rigorous data collection techniques,
- Framing the study within the assumptions and characteristics of qualitative research,
- Using a tradition of inquiry,
- Beginning with a single focus,
- Verifying the accuracy of the research,
- Writing persuasively,
- Analyzing data using multiple levels of abstraction, and
- Writing clearly, engagingly, and with unexpected ideas.

(Creswell, 1998, p. 20-21).

### *Focus Groups as a Methodological Tool*

The research tool chosen in evaluating the NASA Nebraska Space Grant & EPSCoR Native American Outreach Program (NNAOP) was the focus group method. The Nebraska Aerospace Education Summit (NAES) data provided an opportunity to study NNAOP outcomes. The NAES leaders’ intent was to collect data through comprehensive and open discussions regarding certain NNAOP topics or issues. Although “focus group interviews are . . . limited by the fact that the bulk of the behavior is verbal” (Berg, 2001, p. 117), extensive notes were recorded for each focus group. This ensured that the contributions of each group could be clearly documented and analyzed.

The Focus Group method of data collection was employed due to its uniqueness in not only providing answers to specifically addressed questions, but also in providing a means of interaction between summit participants. “Focus groups [are] less expensive and less time consuming than . . . full opinion survey[s]” (Ulmar, 2001). Additionally, focus groups do not “require additional time of the participants or the members of the community” (Ulmar, 2001). The only disadvantage of using a focus group in this situation is that “only a limited number of questions are used” (Ulmar, 2001). However, each question was carefully constructed to solicit specific and useful information for further examination and evaluation.

“Focus groups are advantageous when the interaction among the interviewees will likely yield the best information, when interviewees are similar and cooperative with each other, when time to collect information is limited, and when individuals interviewed one on one may be hesitant to provide information (Creswell, 1998, p. 124). NAES focus group subjects were carefully selected due to their expertise and willingness to voluntarily participate in the study.

The focus group method has the ability to generate insights that might not otherwise emerge. "Attitudes and perceptions relating to concepts, products, services, or programs are developed in part by interaction with other people. We are a product of our environment and are influenced by people around us" (Krueger, 1998, pp. 10-11).

### *Establishing Validity and Reliability*

According to Gerdes & Conn (2001), “Quantitative methods of research rely on hypothesis testing and statistical manipulation and interpretation to establish a research design before the study takes place” (p. 187). This attempts to control variability in order to legitimize the results of statistical calculations. “The researcher gives "operational definitions" to terms, establishes alpha levels to determine statistical significance, and selects a data collection instrument which purports high validity and reliability” (Gerdes & Conn, 200, p. 187). By conducting all planning ahead of time, an investigator may try to control internal and external validity of the study.

“In the case of qualitative methods, the investigator establishes [validity] in a cumulative sense via triangulation, member checks, peer debriefing, and data audits (Gerdes & Conn, 2001, p. 185). By creating a lengthy trail of data collection, each item can be traced to its origin, such as an original conversation, a document, observation, or log or field note entry in a journal. “In addition, the researcher can verify through an auditing process the dependability and confirmability (that findings are a product of the research process, not researcher bias) of the study. (Gerdes & Conn, 2001, p. 187).

“In addition to identifying the nature of the data, . . . researchers should explain to readers how data were collected” (Berg, 2001, p. 276). Such details regarding the data collecting process help determine the credibility of research results and provide an avenue for others to replicate the research study. “This notion of replication is very important to establishing that [a] research endeavor is objective” (Berg, 2001, p. 276).

The matter of a study’s legitimacy is of utmost importance to the competent researcher. “The validity of a study . . . ultimately will be known to those conducting the investigation, whether the study involves quantitative or qualitative methods” (Gerdes & Conn, 2001, p. 185). However, even the most academically stringent and tightly controlled research designs may not be completely valid.

### *Ethical Concerns*

Qualitative research examines the humanistic issues surrounding societal concerns. Such personal information and documentation creates a necessity for researchers to pursue their investigations with increased sensitivity to the issues they are creating and reporting. “Social

scientists . . . have an ethical obligation to their colleagues, their study population, and the larger society” (Berg, 2001, p. 39). As the scope of research expands through the use of more sophisticated and penetrating techniques, so does the need for increased awareness and concerns over research ethics (Berg, 2001).

In order to protect both the researcher and the research subjects, Institutional Review Boards (IRBs) have been created to determine the invasiveness of certain research techniques and to oversee research regulations. “Ideally, IRBs should be seen as a group of individuals who . . . give their time and expertise to ensure that human subjects are neither physically nor emotionally injured by researchers” (Berg, 2001, p. 46). However, some researchers see IRBs as institutions seeking to stifle the research prowess that could create scientific answers to societal problems.

## The NNAOP Backbone

### *The Three Programmatic Pillars*

The need to develop the envisioned Native American program of outreach initially focused on the development of three foundational areas: infrastructure building, curriculum enhancement, and student motivation. So strong was the belief that these three areas were the foundation for any future outreach endeavor, they became the project’s three programmatic pillars. The following section discusses each pillar.

#### 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.

Specific activities closely related to infrastructure building included the formation of the Nebraska Native American Working Group and development of a Memorandum of Understanding with the NASA Space Grant of South Dakota. The NNAWG was formed in February 1997 and included presidents from the states two tribal colleges, superintendents of Nebraska’s four reservation schools (Winnebago, Walthill, Santee, and the Omaha Nation), as well as researchers from NNSG. A series of meetings then took place in which the following issues were discussed:

1. Tribal School/NNSG future educational partnerships,
2. Joint research and grant writing possibilities,
3. Scholarships opportunities and funding mechanisms,
4. Curriculum development for improving K - 12 mathematics, science, and technology education through the use of aeronautics
5. Faculty enhancement workshops
6. Development of a Model of Best Practice.



With respect to the signing of a Memorandum of Understanding (MOU) between the Nebraska and South Dakota Space Grant Programs, that document called for 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.

### Curriculum Enhancement

Improving school mathematics and science curriculum through the use of aeronautics focused on developing instructional skills among the teachers in upper elementary and middle school youngsters. To further this development, selected teachers were awarded grants to attend NASA sponsored workshops. The first of these events took place during the summer of 1998. Four teachers, one at each school district and one each from the two tribal colleges, participated in the week-long Aerospace in the Curriculum Teacher Workshop that will be held at Augustana College in Sioux Fall, SD. 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.

More recently, 8 teachers (4 in 1999 and 4 in 2001) attended the NASA Rural Workshop at NASA Ames Research Center in Mountain View, CA. A major focus of NASA educational initiatives has been to encourage and support outreach programs the impact under-presented minorities. Among the agency's support for such constituencies is the providing of educational materials that include books, videotapes, etc. Such assistance has been a major catalyst for the family science program.

However, NASA has supported the family science project in other ways, as well. In the past few years, NASA Ames Research Center has invited eight teachers from schools(Omaha Nation, Winnebago, Walthill, and Santee) in the northeastern region of Nebraska to participate in its two-week residential NASA Educational Workshop at Moffett Field, California. A significant aspect of this workshop is that it focuses on teachers of Native American students in rural areas and seeks to meet the unique needs of their educational communities.

The NASA Educational Workshop provided opportunities for educators to visit research and applied science facilities and examine topics relating to earth science, aerospace technology, space science, human exploration and development of space, and biological and physical research. In addition to meeting with NASA scientists, engineers, and education specialists, participants worked together to model teaching, learning, assessment, and professional development strategies called for in the science, mathematics, technology, and geography education standards. (NASA)

Along with tours led by NASA experts at the research facilities at Ames, the participants take field trips to study space and earth science topics at local destinations such as the James Lick Observatory, U.S. Geological Survey, and Asilomar State Beach. The teachers return home with their brains as full as their suitcases with NASA mission content as it relates to their classrooms. They also return home with a plan for sharing information from the workshop with their colleagues and communities. The objectives if such a plan should include:

1. To share information about NASA resources, programs, and services with teams from traditionally under- represented populations,
2. To provide an opportunity for the teams to exchange ideas,
3. To provide an opportunity for the teams to develop and implement an action plan that will support standards-based teaching and learning of science, mathematics, technology, and geography,
4. To strengthen partnerships with NASA by sustaining interaction and collaboration after the conclusion of the workshop,
5. To develop and implement an assessment plan designed to evaluate the effectiveness of the action plan (NASA, 2000).

This workshop has endeavored to adapt its focus and style to the needs of its audience. "In Native American cultures, education is grounded in the challenge of learning practical skills and knowledge in a real-life context." (Cajete, p. 145) Therefore, for example, recognizing the importance of the relationship between native people and Earth, the workshop leaders dedicate several days of class time to earth science content—an area of NASA's mission that is frequently less emphasized than the space topics. In addition, with NASA Ames' extensive work in aeronautics and the relevance of that mission to the everyday world, significant classroom time is given to concepts of flight as well as cutting-edge technologies being developed by NASA that will shape flight in the future.

Educationally, workshop participants engage in more hands-on activities and fewer lectures in order to present NASA scientific content in line "with more culturally relevant and learner-sensitive educational approaches" (Cajete, p. 136) Rather than seeking to present a bicultural approach to science, however, this workshop presents "Western" science concepts and provides informal opportunities for participants to process and discuss the information in light of native traditions and ways of knowing. This is particularly important given that some participants come from native communities where up to 60 different tribes are represented in one school.

### Student Motivation

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 spend 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.

### *Family Science*

The Family Science program is designed to involve families working together on several different hands-on activities during evening meetings at school. Special demonstrations and guest speakers are often included in the individual programs. Additionally, ideas are given to parents on how to complete 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. The Family Science program is intended to help 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. By doing such activities, it may become apparent that science is not only for school activities, but also applicable in real life situations. These activities provide additional time for the learning science and enhance student-learning skills

### The Demonstration Project

The initial Family Aeronautical Science (FAS) project involved 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 located on the Santee Sioux reservation near Niobrara, NE. The project included the parents and family of those children and faculty of the school and researchers of the NNSG.

A demonstration project was carried out 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.

### *Program Expansion*

The Families United in the Discovery (FUN) of Science, Family Science, project that is currently operating at the Santee Community Schools in Niobrara, NE has involve selected students and their teachers. The initial target group was upper elementary children approximately 11- 12 years of age in the school. This location served as a demonstration project and included the parents and family of those children; faculty and staff the school and the NASA Nebraska Space Grant.

With the Family Science project at the Santee Sioux Schools underway, this program will now be duplicated with students in the Winnebago and Omaha Sioux Nation school districts. The planning and curriculum development phase was completed during the summer of 2000 and the demonstration project occurred during Fall 2000 and the Spring 2001.

Key activities included basic aerodynamics, flight control systems, wing design, and basic flight. The paradigm will be that students and teachers will cover several appropriate parts of 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 Science Night at the school. The science night included an evening meal plus a combination of science demonstrations by NICC and UNO faculty, directed group activities, visits by NASA researchers/educators, and fellowship. The underlying goal is the continued improvement of mathematics and science skills among these Native American youngsters through involvement of the family unit.

This endeavor will, in the long term, focus on systemic change for the entire Nebraska Native American reservation school network through the implementation of family science. Then programs will be exported to the non-Native American schools in subsequent years. It would be extremely difficult to make state-wide educational change in Nebraska due to the large area of the state and the small population density but a more reachable short term goal will be to focus on change within a minority population that is in desperate need of NASA/ASA assistance.

The benefits of involving parents in education are not confined solely to the early school years. Significant gains at all ages and grade levels can be achieved when parents share in their children's education. Junior high and high school students whose parents remain involved make better transitions, maintain the quality of their work, and develop more realistic plans for their future. Children from diverse cultural backgrounds tend to do better when parents and professionals collaborate to bridge the gap between the culture at home and the learning institution.

### Establishing the Evaluation

The Native American Outreach Program's main objective is to make Native American students more competitive in mathematics and science. This program is the most comprehensive Native American program of any state and has allowed for a variety of activities to take place including: regional and national presentations; interfacing between schools; and formulating administrative leadership conferences. In order to continually provide effective support to Nebraska's Native American community, NSGC & EPSCoR sought an evaluation technique for the Native American Outreach Program. To execute such an evaluation, the NSGC organized the first

Nebraska Aeronautics Education Summit (NAES) Meeting. The diverse group of educators, researchers, and practitioners present at the summit provided a unique opportunity to gather information by employing a focus group research technique. This opportunity was not only beneficial to the Native American Outreach program by assessing its strengths and weaknesses, but also to those who participated in the study by providing them with a worthwhile learning experience. The results and recommendations acquired and included in this document were indeed remarkable. The utilization of the summit participants' recommendations and innovative future plans will ensure continued shared success between NSGC & EPSCoR and the Nebraska Native American community.

On Saturday, December 8, 2001 the NASA Nebraska Space Grant (NSGC) & EPSCoR Programs and the Aerospace States Association sponsored the first Nebraska Aeronautics Education Summit (NAES) Meeting, which was held in South Sioux City, Nebraska near the state's tribal lands. This event was organized to seek a common vision between educators of students in grades K-12 from four Native American public schools and two tribal colleges (see Appendix A). Dr. Henry Lehrer, the NSGC Native American Outreach liaison, began the discussion with an overview of the many activities that have taken place since the inception of Nebraska's Native American Outreach program five years ago. Numerous presentations have been made, interfacing between schools has begun, administrative leadership conferences have been held, and NASA data and models have been utilized to improve mathematics and science programs in Native American public schools.

A variety of enrichment activities have taken place at Nebraska's two Native American colleges, Little Priest Tribal College and the Nebraska Indian Community College, to support their students, faculty and staff. The Native American Outreach Program has assisted in faculty development, aided administration in enhancing curriculum, and developed institutional guidelines for better preparation of students in the sciences. This team of motivated individuals has already begun taking steps toward assisting these colleges in better equipping their science labs.

However, achievements have not been limited to the college level. Nebraska's Native American school systems, comprised of Omaha Nation, Walthill, Winnebago, and Santee, have also participated in many educational events and activities. Those include:

- Eight teachers have attended the annual two-week NASA Ames Summer Workshop;
- Nearly 1,000 5<sup>th</sup> grade students have been involved in the annual Aeronautics Day at Sioux City Airport;
- Santee students attended the annual Aviation Career Education (ACE) Academy sponsored by the Nebraska Department of Aeronautics; and
- The Family Science program has been introduced and will be functioning at all schools in 2002.

The accomplishments that this program has achieved provide the guidelines for implementation of such programs in other states throughout the nation.

## Methodology

The Native American Outreach Program's main objective is to make Native American students more competitive in mathematics and science. This program is the most comprehensive Native American program of any state and has allowed for a variety of activities to take place including: regional and national presentations; interfacing between schools; and formulating administrative leadership conferences. In order to continually provide effective support to Nebraska's Native American community, NSGC & EPSCoR sought an evaluation technique for the Native American Outreach Program. To execute such an evaluation, the NASA Nebraska Space Grant (NSGC) & EPSCoR Programs and the Aerospace States Association sponsored the first Nebraska Aeronautics Education Summit (NAES) Meeting.

The diverse group of educators, researchers, and practitioners present at the summit provided a unique opportunity to gather information by employing a focus group research technique. This opportunity was not only beneficial to the Native American Outreach program by assessing its strengths and weaknesses, but also to those who participated in the study by providing them with a worthwhile learning experience. The utilization of the summit participants' recommendations and innovative future plans will ensure continued shared success between NSGC & EPSCoR and the Nebraska Native American community. Additionally, the collective opinions and ideas will create a new body of knowledge with which to disseminate among Nebraska's Native American educators.

On Saturday, December 8, 2001 the NAES meeting was held in South Sioux City, Nebraska near the state's tribal lands. This event was organized to seek a common vision between educators of students in grades K-12 from four Native American public schools and two tribal colleges. Dr. Henry Lehrer, the NSGC Native American Outreach liaison, began the discussion with an overview of the many activities that have taken place since the inception of Nebraska's Native American Outreach program five years ago. Numerous presentations have been made, interfacing between schools has begun, administrative leadership conferences have been held, and NASA data and models have been utilized to improve mathematics and science programs in Native American public schools.

## *Apparatus*

The diverse group of individuals present at the NAES provided a unique opportunity to gather the evaluation data needed. The research tool chosen to collect this data was the focus group method. This type of data collection was chosen for a variety of reasons. The NAES leaders' intent was to collect data through comprehensive and open discussions regarding certain NNAOP topics or issues. Although "focus group interviews are . . . limited by the fact that the bulk of the behavior is verbal" (Berg, 2001, p. 117), extensive notes were recorded for each focus group. This ensured that the contributions of each group could be clearly documented and analyzed.

The focus group method of data collection was also employed due to its uniqueness in not only providing answers to specifically addressed questions, but also in providing a means of interaction between summit participants. Focus groups "require far less time than individual

interviews [while involving] the same number of participants” (Berg, 2001, p. 116). Additionally, focus groups do not “require additional time of the participants or the members of the community” (Ulmar, 2001). The only disadvantage of using a focus group in this situation is that “only a limited number of questions are used” (Ulmar, 2001). However, each question was carefully constructed to solicit specific and useful information for further examination and evaluation.

“Focus groups are advantageous when the interaction among the interviewees will likely yield the best information, when interviewees are similar and cooperative with each other, when time to collect information is limited, and when individuals interviewed one on one may be hesitant to provide information (Creswell, 1998, p. 124). NAES focus group subjects were carefully selected due to their expertise and willingness to voluntarily participate in the study.

The focus group method has the ability to generate insights that might not otherwise emerge. "Attitudes and perceptions relating to concepts, products, services, or programs are developed in part by interaction with other people. We are a product of our environment and are influenced by people around us" (Krueger, 1998, pp. 10-11).

Focus groups provide a more informal atmosphere to a research group, which allows “subjects to speak freely and completely about behaviors, attitudes, and opinions they possess” (Berg, 2001, p. 111). Participants are able to draw from each other’s thoughts and ideas, which results in a collective brainstorming session. This allows for a larger number of issues to be addressed and solutions to be generated. “It is this group energy that distinguishes focus group interviews from more conventional styles [such as] . . . face-to-face interviewing” (Berg, 2001, p. 112).

“Focus group interviews allow the researcher to observe a process that is often of profound importance to qualitative investigations – namely, interaction” (Berg, 2001, p. 112). This interactive format allows a variety of attitudes, experiences, and opinions to permeate the session. The collective viewpoints of the study participants are given greater emphasis “because interactions between group members largely replaces the usual interaction between interviewer and subject” (Berg, 2001, p. 115).

The data that is obtained through focus groups is not limited to the participants’ answers. “Researchers can observe session participants interacting and sharing specific attitudes and experiences, and they can explore these issues” (Berg, 2001, p. 115). This interaction produces “greater amounts of detail on various attitudes, opinions, and experiences” (Berg, 2001, p. 115).

### *Participants*

A variety of disciplines and institutions were represented at the Saturday event. Those present included educators and administrators from Nebraska’s four Native American public schools and two tribal colleges, university faculty from several Nebraska institutions, researchers, and industry representatives. Each participant was carefully selected on the basis of their expertise regarding issues that affect Nebraska’s Native American population (see Appendix A). In order to continue to provide consistently effective support to Nebraska’s Native American community,

NSGC & EPSCoR sought an evaluation technique that would not only benefit the program by assessing its strengths and weaknesses, but also offer a learning experience for those involved.

### *Sampling*

A nonprobability sampling technique was chosen “to create a kind of quasi-random sample and . . . to have a clear idea about what larger group or groups the sample may reflect” (Berg, 2001, p. 31-32). “Nonprobability samples offer the benefits of not requiring a list of all possible elements in a full population, and the ability to access otherwise highly sensitive or difficult to research study populations” (Berg, 2001, p. 32). The researchers’ objective was to configure the groups with persons who were capable of providing the highest-quality discussion about the Native American Outreach Program (Greenbaum, 1998).

Although the researchers’ intention was to assemble a group of participants through purposive sampling, one might describe the researchers’ method of selecting participants as either convenience sampling or purposive sampling. The participants were gathered in an effort to generate intelligent contributions to the Nebraska Aeronautics Education Summit meeting discussions, and thus could be seen as a convenient group to interview. However, each individual was purposely and specifically selected to attend due to their knowledge and expertise in the educational arena of Nebraska’s Native American community.

Convenience sampling can be referred to as “an accidental or availability sample” (Babbie, 2001, in Berg, 2001, p. 32). Although the NAES meeting was convened prior to the focus group being conducted, each participant was fully aware that such interviewing would be taking place. Additionally, each attendee agreed voluntarily to contribute their thoughts and feelings to the interactive discussion of the focus group interviews.

The researchers remained sensitive to the various current Native American issues when determining who would be invited to participate in the focus group sessions. The researchers used their knowledge of Nebraska’s Native American educators to select subjects who would sufficiently represent this population (Berg, 2001). “The problem here . . . is the dependence on the researcher and the cooperation of those” participating in the study (Shipman, 1997, p. 59). However, the researchers took great care in ensuring that representatives from each of Nebraska’s four Native American public schools (Macy, Santee, Walthill and Winnebago) and two Native American colleges (Little Priest Tribal College and Nebraska Indian Community College) were present. Also present were members of Nebraska’s Omaha tribe. Others invited included representatives from a variety of Nebraska’s colleges and universities.

Although the purposively sampling chosen did not account for wide generalizability, this participant gathering technique offered an efficient and effective method for collecting the necessary evaluative data (Berg, 2001).

### *Procedure*

Before conducting the focus groups, the researchers determined that the interviews would be limited to thirty minutes in length. This took into consideration that each attendee was



participating voluntarily and that each individual has already attended the NAES meeting. In order to not take advantage of the participants, the researchers remained sensitive and committed to the amount of time allotted for interviewing.

Rather than provide payment in exchange for focus group participation, the researchers determined that other rewards would ensue from attendance. All participants were offered a variety of foods and beverages for their effort as well as a comfortable environment in which to work. Additionally, the researchers created the opportunity to voice concerns and comments regarding a program that is intricately involved in the education of Nebraska's Native American children. Attendees could interact with each other and benefit from a worthwhile learning experience.

It was determined that the most efficient way of collecting the necessary evaluation data through a focus group would be to divide the participants into three small groups. Dr. Ed Zendejas, Ms. Michaela Schaaf, and Ms. Mary Fink were selected to lead these three groups, while Dr. Henry Lehrer served as overall focus group moderator. Additionally, each group was provided with a recorder to ensure that group leaders could focus on the group discussion, rather than documenting each response.

Each leader kept their participants focused on the issues at hand, making sure each opinion was documented. NAES Focus Group participants were encouraged to share their perspectives and insights about each issue. Each group provided valuable opinions and suggestions for refining this extraordinary program.

The four questions that each focus group was asked to answer were stated as follows:

1. Is the use of NASA-based aeronautics and space to teach mathematics, science, and technology a viable motivator of Native American youth, particularly at-risk students?
2. Can Family Science make a difference and how can the concept be streamlined? Has the ASA sponsored Family United (FUN) in the Discovery of Mathematics, Science, and Technology initiative been effective?
3. Should there be a continuous NASA-based science and mathematics track from elementary/secondary to tribal college?
4. How should the UNO Aviation Institute and the Nebraska NASA Space Grant & EPSCoR proceed in the coming years to better serve the students, faculty, and staff of the state's 4 reservation schools and 2 tribal colleges?

### *Limitations*

When utilizing judgment samples or non-probability samples, researchers run the risk of relaxing their reliability. "Sampling error, the difference between a population value and a sample estimate of that value, occurs because only a sample rather than a complete consensus of the population is surveyed" (Gubrium & Holstein, 2002, p. 60). However, given the small number of Native American educators in Nebraska and the educated method that was used to select focus group participants, the researchers created a more reliable and, thus reproducible, study.

Gubrium and Holstein (2002) discuss three nonsampling errors in their book “Handbook of Interview Research.” Those errors include: “coverage error, the failure to give some members of the target population any chance of being included in the sample; nonresponse error, the failure to obtain data from all sampled persons; and measurement error, inaccuracies in what respondents report” (p. 60). The focus group participants were encouraged to discuss their thoughts and opinions regarding each research question. Group leaders monitored this discussion ensuring that each response was recorded. Although this qualitative method of data collection does not take into account the answers that may not have been offered, the focus group method created an enticing atmosphere for learning and consensus building.

The researchers were aware that only a limited number of participants would be studied in the somewhat artificial environment that had been created under experimental conditions. Therefore, they cannot rule out the possibility that participants may have felt time pressure. The researchers attempted to minimize this by explicitly instructing the participants to take their time in trying to evoke high quality answers rather than quick answers.

### *Reliability*

Reliability refers to whether or not specific research techniques can be “applied repeatedly to the same object [and] yield the same result each time” (Babbie, 1998, p. 129). Focus group research is unique in that responses are enhanced by the interaction of study participants. Thus, even if the same participants were convened and questioned repeatedly, outside variables such as environment, health, etc. could impact their responses. The responses may be similar, yet not exact. However, this addresses the accuracy of the responses rather than whether or not the researchers’ techniques were reliable.

Reliability is a concern because there is “no certain guard against the impact of [an] observer’s subjectivity” (Babbie, 1998, p. 131). However, qualitative studies are subjective in nature, where researchers’ objectives are to seek subjective information such as experiences or feelings. The researchers conducting the NNAOP focus groups were not only collecting this personal and unpredictable humanistic information, they were relying on the data to answer evaluative questions regarding the program.

### *Validity*

According to Babbie (1998), “validity refers to the extent to which an empirical measure adequately reflects the real meaning of the concept under consideration” (p. 133). However, concepts such as the effectiveness of a program cannot be assigned a particular measure that adequately reflects their meaning. Thus, researchers must agree on the criteria that will be used to measure success.

The focus group questions were systematically developed to produce a specific set of responses in regard to the efficiency and effectiveness of the NSGC Native American Outreach Program. By avoiding erroneous and irrelevant responses, the researchers formed questions that would produce a significant amount of data with which to analyze past NNAOP activities and base future endeavors.

This study's researchers realize that a variety of evaluations and decisions will arise as a result of the data collected. However, to remain unbiased regarding the results, the researchers will maintain open points of view while analyzing the data. Additionally, an outside researcher will independently examine the data, in an effort to draw comparable conclusions, a "kind of inter-coder reliability check" (Berg, 2001, p. 36).

It is intended that through this research study, the evaluative data will not only be presented to the academic community, but also to NNAOP personnel to ensure continued program success. The researchers understand that the analyzed information "must be disseminated if it is to be considered both worthwhile and complete" (Berg, 2001, p. 37).

### *Data Analysis Procedure*

The innovative data analyzing software, EZ Text, was utilized in determining correlation between NAES focus group responses (see Appendix C).

## Results

After all questions had been addressed by each focus group, the summit was reconvened and recommendations from each group were compiled. Each group provided valuable opinions and suggestions for refining the NSGC Native American Outreach program. Each question and their subsequent group answers are provided below (see Appendix D).

1. Is the use of NASA-based aeronautics and space to teach mathematics, science, and technology a viable motivator of Native American youth, particularly at-risk students?

Two of the three focus groups expressed their desire to see more exciting, hands-on activities become available for participating students. These activities could include archeological digs, zoo visits, forest excursions, camp stays, and planetarium demonstrations, among others. Such tangible events would expose students to career options and opportunities in Nebraska, while teaching youngsters that math and science related careers are attainable. Additionally, the focus groups highlighted the need for continuous staff and faculty development. This includes providing training for educators in community awareness, lesson plans, and other related educational requirements. Other needs addressed included starting the program in younger grades, better integration of math and science into the curriculum and culture, and accounting for the non-traditional Native American student.

2. Can Family Science make a difference and how can the concept be streamlined? Has the ASA sponsored Family United (FUN) in the Discovery of Mathematics, Science, and Technology initiative been effective?

According to the participants, the Family Science (FUN) Program is an excellent concept, which is streamlining itself by its holistic and cohesive model. The FUN Program emphasizes food and prayer, while encouraging parents and the community to join the activities. Of high priority was the fact that families are learning the positive aspects of working together and seeing the benefits

of a Parent-Community-NASA partnership. The values of this program are very near those of the Native American culture, focusing on the involvement of the entire community. Additionally, this program removes the mystery and fear of math and science. This provides a positive family perception of education and the increased opportunity for parents to build faith in the abilities of their children. However, as stated by two of the focus groups, the scope and sequence of FUN must have uniformity to clearly define the “what” and “when” aspects of the program. A clear foundation or blueprint would allow the curriculum and staff to adapt to changing needs. This could allow for greater retention of students through college graduation and ultimately lead to a higher level of success.

3. Should there be a continuous NASA-based science and mathematics track from elementary/secondary to tribal college?

Overall, a tracking system was seen as a positive step toward collegiate success for Native American students. However, such an endeavor should include a NASA-based math and science track with the incorporation of camps, classes and other activities that could help determine what fields interest students. In order to aid in the Native American Outreach Program’s success, extra emphasis should be placed on the progress of students in grades 4 through 9 and specific students should be selected to track their individual progress.

Also mentioned was the need to include younger students in the program, such as those in pre-Kindergarten classes. In order to adapt to future generations, the scope and sequence for these and other classes should be evaluated through faculty meetings. Additionally, a database that correlates with state standards should be created for providing uniform lesson plans. A worthy perspective that was offered by only one focus group was the necessity for elementary, secondary and college institutions to coordinate their efforts and to dialogue between themselves. Another single opinion stated that schools are losing students to lack of opportunities. Remedies to this problem included increased encouragement and reinforcement of female students and the implementation of mentoring programs. The importance of promoting Math and Reading readiness was also offered, which should involve the utilization of the Nebraska Department of Education Commission’s student database.

4. How should the UNO Aviation Institute and the Nebraska NASA Space Grant & EPSCoR proceed in the coming years to better serve the students, faculty, and staff of the state’s 4 reservation schools and 2 tribal colleges?

One opinion that echoed throughout the summit was the necessity to create mutually and equally beneficial partnerships between the Native American schools and their funding sources. These partnerships must be serious and realistic since many Native American schools lack necessary space and resources. Of high priority is the need for incorporating speakers into the Native American Outreach Program was also discussed. Native American professionals such as NASA Astronaut, John Herrington, could to speak to students and thus provide role models for academic encouragement. Also mentioned was the need for increased faculty development. Additional training in curriculum, lesson planning, specific courses, and research techniques should be addressed in the proposed development. Those items discussed at the reconvened meeting, yet offered by only one focus group, include the following:

- Introducing large-scale events, such as science fairs, rallies, and contests, for the entire community to attend;
- Technology networking is needed for distance learning and college recruitment;
- A resource website should be provided for employment opportunities;
- Research is important and needed to enhance educators' background and to provide baselines for continued improvement of the Native American Outreach Program; and
- Scholarships should be tied to the specific needs of the student and the community.

After all questions were addressed, the summit was reconvened to identify major points of agreement between each group. The opinions, perspectives and recommendations from each group were then compiled. A variety of superior suggestions were brought to the table for discussion. The following is a list of key recommendations that were offered and that the Native American Outreach program is now addressing.

#### NAES Focus Group Recommendations:

1. Staff development could be increased in Native American schools by addressing scope and sequence through training and regular faculty and staff meetings.
2. Engage teachers in research and inquiry to involve them in the gathering of information and to allow them to experience tangible results.
3. Integrate Native American culture and values into the NASA sponsored programs to ensure not only that the students are aware of their heritage, but also to provide consistency between school and home.
4. Cultivate and promote Native American administration and partnerships with NASA as advised by the Presidential Executive Order.
5. Develop a partnership format between the Native American schools and the grant agency that will promote equally beneficial outcomes.
6. Create a Space Grant facility to be staffed by professionals in the Native American community.
7. Communicate the importance of Native American Outreach program awareness to teachers and administrators through promotion and visibility.
8. Utilize banners at each involved school to promote community awareness of the Native American Outreach Program components and activities.

#### Discussion

The Native American elementary schools, secondary schools and colleges with which our Outreach Program is working, are in need of many resources for technological and educational advancement. Additionally, the need for integration between all levels of schooling is imperative to ensure reinforcement of educational information and to provide a tracking process for students interested in mathematics and science. The Native American culture is one that promotes community involvement and awareness. The Family Science program integrates this involvement into the schools by providing a positive environment for families to learn together through science-based activities. The primary focus of this program is to get students to become more interested in mathematics and science through the use of airplane and rocket Study units.

This program, which is already in place in many of the Native American public schools, is flourishing. The NSGC & EPSCoR Program seeks to continue such programs and provide the development and enhancement of additional community-wide educational opportunities. Future plans include:

- Developing elementary and secondary school mathematics and science courses as “feeder programs” for colleges and universities;
- Using distance education to reach non-traditional collegiate students;
- Creation of a summer mathematics institute for recent high school graduates;
- Providing science field trips and summer science camps;
- Designing a Native American Aeronautics Education Outreach website; and
- Increasing community involvement and awareness through a unique banner program.

### Conclusion

The Native American Outreach Program is focused on making Native American students more competitive in mathematics and science. Whether this is done through providing additional scholarships and fellowships or through cultivating the relationships being established between educators and NASA, the program is a prime example of prophetic thinking and planning. Those involved in the Nebraska Aeronautics Education Summit meeting participated in this forward thinking by offering their ideas and contributing their expertise. Although the culmination of the first five years of this successful program has taken place, the collaboration provided by the summit participants gives vision for many years to come. An implementation team funded by a NASA EPSCoR grant has already been established to ensure that these future outcomes see fruition. Those in the ASA, the NSGC & EPSCoR program, the Native American schools and the community look forward to experiencing the same high level of achievement in the future.

## References

- American Psychological Association. (2001). *Publication manual*. (5<sup>th</sup> ed.). Washington, DC: Author.
- Babbie, E. (1998). *The practice of social research*. (8<sup>th</sup> ed.). Belmont, CA: Wadsworth Publishing.
- Berg, B.L. (2001). *Qualitative research methods for the social sciences*. Boston, MA: Allyn and Bacon.
- Bowen, B., Lehrer, H., & Nickerson, J. (2001). The role of aeronautics and space in Native American education: Evaluation and visioning analysis communiqué. Nebraska Aeronautics Education Summit Meeting sponsored by NASA Nebraska Space Grant & EPSCoR and the Aerospace States Association.
- Cajete, G. A. (1999). The Native American Learner and Bicultural Science Education. In K.G. Swisher & J.W. Tippeconnic III (eds.), *Next Steps: Research and Practice to Advance Indian Education* (pp. 135-160). Charleston, WV: Appalachia Educational Laboratory.
- Creswell, J.W. (1998). *Qualitative inquiry and research design: Choosing among five traditions*. Thousand Oaks, CA: Sage.
- Gerdes, D.A. & Conn, James, H. (2001). A user-friendly look at qualitative research methods. *Physical Educator*, 58, 183-190.
- Greenbaum, T. (1998). *The handbook for focus group research*. Thousand Oaks, CA: Sage Publications, Inc.
- Gubrium, J. & Holstein, J. (Eds.). (2002). *Handbook on interview research*. (2<sup>nd</sup> ed.). Thousand Oaks, CA: Sage Publications, Inc.
- Kreuger R.A. (1994) *Focus groups: A practical guide for applied research*. Thousand Oaks, CA: Sage.
- Lehrer, H. R. (1996). "A Nebraska Space Grant/EPSCoR Aeronautics Initiative: An Articulation Model with Tribal Colleges." Western Region Space Grant Meeting, Santa Fe, NM, November 1996.
- Lehrer, H.R. (2000). "Articulation Between UNOAI and the Nebraska Native American Educational Community: An Exciting And Fulfilling Adventure." National Indian Impacted Schools Association Conference, Omaha, NE, June 2000.
- Morrow, G.P., Burris-Kitchen, D., & Der-Karabetian, A. (2000, December). Assessing campus climate of cultural diversity: A focus on focus groups. *College Student Journal*, 34, 589-603.
- National Aeronautics and Space Administration (NASA) (2000). *NASA Educational Workshops (NEW) for Urban and Rural Teams* (EP-2000-11-394-HQ) [Brochure]. Washington, DC: Author.
- Shipman, M. (1997). *The limitations of social research*. (4<sup>th</sup> ed.). New York, NY: Addison Wesley Longman.
- Ulmar, S. (2001). *Focus groups*. Retrieved December, 2001 from <http://cid.unomaha.edu/~unoai/avn8120/tools/definitions/focusgroup.html>

## Author Bios

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Mrs. Nickerson is the Research Implementation and Communications Specialist for the University of Nebraska at Omaha Aviation Institute. She holds a Bachelor's degree in Aviation Studies and Master of Public Administration degree, Aviation Concentration, from the University of Nebraska at Omaha. Mrs. Nickerson's responsibilities include implementation of funded research programs, grant report and proposal writing, development of applied research programs, and aeronautics and space education outreach. Mrs. Nickerson is a Federal Aviation Administration licensed and instrument rated Private Pilot.

### **Brent D. Bowen, Ed.D.**

Dr. Bowen is the Regent's Distinguished Professor of Aviation and serves as Director for the Aviation Institute and as Director of the Division of Air Transportation Policy at the University of Nebraska at Omaha. Additionally, Dr. Bowen is the program director and principal investigator for the National Aeronautics and Space Administration funded by the Nebraska Space Grant Consortium and NASA EPSCoR Program. He is an Airline Transport-rated Pilot and serves as an Aviation Safety Counselor for the Federal Aviation Administration.

### **Henry R. Lehrer, Ph.D. – Principal NNAOP Investigator**

Dr. Lehrer is a Part-Time Professor at the University of Nebraska Aviation Institute. He holds an Airline Transport Pilot rating with Cessna Citation Type Rating and is a Certified Flight Instructor (Gold Seal) with Instrument and Multi-engine ratings. Dr. Lehrer is the past president of the University Aviation Association and the Founding Editor of the Journal of Aviation / Aerospace Education & Research (JAAER), the first refereed journal in the field. His primary research interests are in the area of curriculum development. Dr. Lehrer leads a NASA-funded initiative to enhance Native American opportunities in aeronautics and space transportation.



## Appendix A

## Nebraska Aeronautics Education Summit (NAES)

## Agenda

Sponsored by  
*Nebraska NASA Space Grant and EPSCoR*  
 in conjunction with *Aerospace States Association*

Marina Inn – S. Sioux City, NE  
 December 8, 2001

**Overview**

- The Nebraska Space Grant & EPSCoR has engaged in outreach to the state's Native American educational community for 5 years.
- Interface has occurred at the elementary, secondary, and collegiate levels.
- The main focus has been to improve mathematics and science using NASA data and models.
- One faculty member has been tasked with developing a broad-based educational assistance plan.
- Numerous presentations on activities have been made at the regional and national level.
- Nebraska has the most comprehensive Native American outreach program of any state.

**Tribal College Specifics (LPTC and NICC)**

- Assistance in faculty development through workshops and faculty fellowships.
- Grants for technology and library enhancements.
- Aiding administration in developing and enhancing curriculum.
- Development of institutional guidelines for better preparation of students in the sciences and specifically pre-engineering and nursing.
- Discussions have begun about how to assist these colleges in better equipping their science labs.
- One mathematics faculty member has been given a fellowship focused solely on identifying and nurturing future mathematics and science students.

**Elementary/Secondary Specifics (Omaha Nation, Walthill, Winnebago, and Santee)**

- Aeronautics Day at Sioux City Airport has involved close to 1,000 5<sup>th</sup> grade students from the schools above over a 5-year period.
- Selected teachers (4 in 1999 and 4 in 2001) have attended a two-week NASA Ames Summer Workshop.
- Family Science began at Santee in the 2000-2001 school year.
- Additional Family Science programs have started this fall at Walthill and Winnebago
- Omaha Nation will begin Family Science next term.
- Santee students have attended ACE (Aviation Career Education) Academy
- Library enhancements at Santee.
- The UNA Stargazer program will have Nebraska students the summer of 2002.

## Appendix A (continued)

**Family Science**

- Basic aeronautics are taught during the school days as part of the class science period.
- After school use of the computer lab is encouraged.
- Evening meetings, with dinner included, or parents and children. Activities include science-based activities.
- The primary focus of the program is to get students to become more interested in mathematics and science through the use of airplane and rocket study units.
- Strengthening the family unit through studying science together is a value-added benefit.

**Future Plans**

- It is imperative that more attention be given to grade 7 to 12.
- A focus needs to be developed that views the elementary and secondary school science and mathematics courses as “feeder programs” for post-secondary institutions.
- More use of distance education or other time/place independent methods of instructional delivery to reach non-traditional collegiate students that have trouble attending regular class sessions due to family/work obligations.
- A summer mathematics institute for recent high school graduates. Priority given to pre-engineering or pre-nursing students.
- Science field trips and/or summer science camps for rising high school or collegiate science students.

**Discussion Questions and Focus Group Topics Include:**

- Is the use of NASA-based aeronautics and space to teach mathematics, science, and technology a viable motivator of Native American youth, particularly at-risk students?
- Can Family Science make a difference and how can the concept be streamlined? Has the ASA sponsored Family United (FUN) in the Discovery of Mathematics, Science, and Technology initiative been effective?
- Should there be a continuous NASA-based science and mathematics track from elementary/secondary to tribal college?
- How should the UNO Aviation Institute and the Nebraska NASA Space Grant & EPSCoR proceed in the coming years to better serve the students, faculty, and staff of the state’s 4 reservation schools and 2 tribal colleges?

## Appendix B

## Native American Summit Meeting Participants

Saturday, December 8, 2001

Shelly Avery, Nebraska Indian Community College  
Otto Bauer, University of Nebraska at Omaha  
John Block, Little Priest Tribal College  
Brent Bowen, University of Nebraska at Omaha  
Larry Carstenson, University of Nebraska – Kearney  
Ann Downes, Little Priest Tribal College  
Lynne Farr, University of Nebraska Medical Center  
Mary Fink, University of Nebraska at Omaha  
Terry Foster, University of Nebraska – Lincoln  
David Friedli, Omaha Nation  
George Gogos, University of Nebraska – Lincoln  
Terri Greenleaf, Winnebago Schools  
Gary Ham, Walthill Schools  
Wanda Henke, Santee School  
Julia Hoffman, University of Nebraska at Omaha  
Crystal Klein, Omaha Nation  
Hank Lehrer, University of Nebraska at Omaha  
Roger Lempke, Nebraska National Guard  
Virgil Likness, Winnebago Public Schools  
Jocelyn Nickerson, University of Nebraska at Omaha  
Sandra Ostrand, Walthill Schools  
Bob Pawloski, University of Nebraska at Omaha  
Avonell Prochaska, Walthill Schools  
Betty Red Leaf, Little Priest Tribal College  
Michelle Richling-Milliken, Walthill Schools  
Michaela Schaaf, University of Nebraska at Omaha  
John Schalles, Creighton University  
Robert Stands, Nebraska Indian Community College  
Gail Thompson, Little Priest Tribal College  
Ed Zendejas, University of Nebraska at Omaha

## Appendix C

## NAES Focus Group Questions vs. E Z Text Interpretations

**NAES focus group questions from Saturday, December 8, 2001 Summit Meeting:**

1. Is the use of NASA-based aeronautics and space to teach mathematics, science, and technology a viable motivator of Native American youth, particularly at-risk students?

In order to motivate Native American youth to more aggressively learn mathematics, science, and technology, **all** three focus groups appear to agree on the importance of hands-on experiences. The participants suggested that teachers should do the following: 1) bring students to the actual field laboratories to expose them to the field/career; and 2) highlight connections between science and real-world applications to fill the learning gap. Additionally, activities such as understanding fish and wildlife, archeological digs, national park service, astronomy, space, blow-up planetarium SASM camping, ham radio licensing, and activities of Civil Air Patrol, are good motivators to elevate the excitement of learning scientific courses for Native American youth.

Group **one and three** also agreed on two other points: 1) create possible futures and 2) a revised format of education in science. Both groups stated that teachers should give career options by exposing students to additional and different vocabulary, technology, etc. for building careers and inspiring interest. This teaches the students that careers in science and technology are attainable, helping students overcome obstacles of self-doubt.

In addition, **group one and three** also suggested that educational information must be integrated into curriculum and culture rather than imported. Due to the amount of non-traditional students, the option of part-time education should be researched to allow additional students to obtain degrees.

2. Can Family Science make a difference and how can the concept be streamlined? Has the ASA sponsored Family United (FUN) in the Discovery of Mathematics, Science, and Technology initiative been effective?

**All** three focus groups agreed that it seems very effective to encourage families to work together. Evaluation would work best by obtaining suggestions from those involved (i.e., parents, Native American community, NASA, etc.). Family Science could be seen as successful because it provides a positive family perception of education and parents can develop respect for their children and build faith in their children's abilities. Thus, future educational and career opportunities look more promising from the parents' perspective.

**Group one and three** agreed that the Family Science should truly reflect local culture value. The concept should be streamlining, holistic, and cohesive. It should also be very close to the Native American values especially in attempting to involve the entire community (community buy-in).

## Appendix C (continued)

3. Should there be a continuous NASA-based science and mathematics track from elementary/secondary to tribal college?

**All three** groups agreed that building a continuous flow of tracking system is essential. The tracking system should be in a continuous format through to the student's college graduation. If done right, stability in progress tracking can be created.

**Group one and two** suggested that the NASA-based math/science track system be developed into a uniform system or the state standards of evaluation be adopted. Likewise, a database for standard lesson plans should be created.

**Group one and two** agreed that the performance tracking should be done as early as possible, such as Pre-K. Additionally, the most important duration of progress tracking is between 4<sup>th</sup> and 9<sup>th</sup> grade.

4. How should the UNO Aviation Institute and the Nebraska NASA Space Grant & EPSCoR proceed in the coming years to better serve the students, faculty, and staff of the state's 4 reservation schools and 2 tribal colleges?

There is no overall agreement among the three focus groups regarding this question. However, group **one and two** agreed on three concepts involving the future of the UNO Aviation Institute (UNOAI) and the Nebraska NASA Space Grant (NSGC) & EPSCoR Programs. First, strengthen a beneficial alliance between the NSGC & EPSCoR and the Native American community; second, support better-equipped and more efficient Native American school facilities; and third, create more useful partnerships. Both groups suggested that NSGC & EPSCoR create mutually/equally beneficial partnerships (i.e., Native American schools lack resources, NASA could fund the salary of a science teacher, filling the labor shortage while producing a better-quality education). In addition to pursuing higher income for qualified teachers, NSGC & EPSCoR must provide serious and realistic partnerships that sincerely seek to help Native American schools. NSGC & EPSCoR should consider other large-scale events for all schools and the Native American community to attend (i.e., science fairs, rallies, contests, guest speakers like Native American astronaut - John Herrington). The technology networking is also helpful to overcome the barriers of distance and shortage of facilities while providing a more aggressive Internet announcement of job openings.

## Appendix C (continued)

## Critique of EX Text user's guide

The Ex Text should be convenient to use. Yet, during my trial-and-error duration, an important part of the user guide was missing, which assigned coders to each respondent. According to Ex Text (97 version), a qualitative researcher should first design his/her semi-structured questionnaire. After the design, researcher should create a database to store all collected feedback from respondents. When all feedback is documented, the researcher must use his/her own codes based on the uniqueness/category of themes or meanings personally interpreted.

After completing the coding process, the researcher should assign codes to each response. There is only one codebook that collects all codes from all responses. Therefore, the researcher must recognize which codes are specifically associated with a particular response's ID. The researcher must assign those unique codes from the codebook to specific response's questions before their data search. However, most of the assigned code combinations are different and the codebook has already been generated. This situation made the response assigning coder a complex process due to the large amount of responses.

My only suggestion for revision of the Ex Text software would solve the two aforementioned problems. The suggestion would be to automatically assign codes to the response's ID and store into project codebook when coding each response's feedback. This would not only dramatically reduce time in the coding process and assigning data, but also reduce man-made input errors.

Appendix D  
NAES Focus Group Complete Data Set

**Focus Group #1 – Leader: Ed Zendejas**

Question #1 Answers

Motivation:

- Hands on, exciting
- Starting with younger children who are ready to learn
- Information must be integrated into curriculum and culture rather than imported
- Native American culture uses rewards and positive reinforcement and this must be integrated into the program
- When the students leave the classroom they should be given something tangible (not a t-shirt)
- Gives career options by being exposed to different vocabulary, technology, etc. for building careers and inspiring interest
- Bringing students to the actual field laboratories to expose them to the field/career
- Teaching students that these careers are attainable and overcoming obstacles
- Bringing in successful role models (Native American astronaut)
- Try to catch the interest of students at an earlier age
- We must account for the non-traditional student
  - Perhaps part-time education could allow additional students to obtain degrees

Question #2 Answers

Streamlining Family Science

- Seems very effective to involve families to work together
- Excellent concept (it is streamlining itself) – holistic, cohesive
- Very close to the Native American values of involving the entire community
- Would work best to get suggestions from those involved

Question #3 Answers

- Building on a continuous flow
- If done right, we can create stability
- Must start younger (Headstart Program)
- Track students to specific fields (camps, classes, etc.) by determining what interests them
- Must adapt to the next generation
- Coordinate elementary, secondary and college (these institutions must dialogue)
- Losing students to lack of opportunities

Question #4 Answers

- Must create mutually/equally beneficial partnerships
  - Native American schools lack resources, NASA could fund the salary of a science teacher (filling the labor shortage while producing a better quality education)
- Must have serious and realistic partnerships
- Native American schools lack space and resources (personnel)

## Appendix D (continued)

**Focus Group #2 – Leader Mary Fink**

## Question #1 Answers

- Staff/faculty development must be continuous
  - Teacher training
  - Community awareness
  - Lesson plans
- NASA needs to follow-up post workshop
- Need to highlight connections between science and real world applications – filling the gap
- How is motivator (NASA) connected to the entire education experience?

## Question #2 Answers

- Scope and sequence must have uniformity (determining the what and when)
  - Remove excess duplication
  - Necessary to reinforce via applications such as tutoring
- FOUNDATIONS/BLUEPRINT
- Our measure or “success” = should be retention through to college graduation
- The time spent on each task should lead to success
- Parent/Community/NASA involvement

## Question #3 Answers

- Must have a NASA-based math/science track
- Track attendance of students (emphasizing 4<sup>th</sup> through 9<sup>th</sup> grades who sometimes lose interest)
- Target start grade needs to be earlier such as Pre-K (Headstart Program)
- Use to promote Math and Reading readiness
  - Utilize the Nebraska Department of Education Commission’s student database
- Must have correlation with state standards

## Question #4 Answers

- Consider other large-scale events for all schools and community to attend
- i.e. Science fairs, Rallies, contests, speakers (Native American astronaut, John Herrington)
- Need technology networking
  - distance learning at Santee
  - college recruitment
- Provide a resource website to offer employment opportunities



## Appendix D (continued)

**Focus Group #3 – Leader Michaela Schaaf**

## Question #1 Answers

- Hands on activities such as:
  - Earth Kam on ISS: (3 or 4 IBM thinkpads / students assigned roles)
  - Fish & Wildlife – endangered species
  - Archeological digs (Lynch, NE)
  - Civil Air Patrol
  - Construction
  - SASM Camp – certificate
  - Zoo – hands on
  - Fontenelle Forest
  - Ham Radio License
    - Talk to astronauts, Emergency response team, Community implications
- Astronomy, space, blow-up planetarium
- Seeing career opportunities here in Nebraska
- Exposure
  - Maintenance, etc.
  - National Park Service
  - Army Corp. or Engineers
- NSIP
- NASA Student Involvement Program

## Question #2 Answers

- Validation:
  - Take away mystery and fear of math and science
  - Successful because family perception of education
  - Get families together
  - Parents develop respect for children and build faith in their abilities
  - Future educational and career opportunities look more promising from the parents' perspective
- Food, family time
- Freedom of picking a station
- Emphasizing food and prayer
- Community buy-in
- Tracking numbers in classes
- Must be able to adapt

## Question #3 Answers

- Career awareness
  - Hand pick students to track their progress
- Girls need more encouragement and reinforcement
- LPTC:
  - Average age is 34
  - 80% female
  - 60% part-time
- “Turf” issues
- AISES Chapter

## Appendix D (continued)

- LPTC Mentors for high school students
- Mentoring Programs
- Speaker Series
- Meeting between faculty to discuss scope and sequence
- Community-wide workshops
- Standards
  - Create a database for standard lesson plans
  - Themes need to identify standards of they will not be utilized

## Question #4 Answers

- Research
  - Break down into skills
  - Needs to be done – important
  - Baselines are needed
  - Action research
  - Research as “inquiry”
  - Use the word from each tribe that is similar to “research”
- Faculty development
  - Train in curriculum areas, lesson plans and courses
  - Substitute teachers need a solid foundation
- Need to tie scholarships to these needs

## \*Additional Question Suggested by Focus Group #3: What can we give back?

- Data collection
- Time
- Cultural diversity (these are issues they can add)
- Talking circles