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ABSTRACT

The Fairbanks American Indian Science and Engineering Society (AISES) Science Camp was designed for Alaska Native middle school students from 11 school districts. The camp enables students to learn from Native Elders while completing hands-on science projects; stimulates interest and confidence in mathematics, science, and engineering among Alaska Native students; provides a curriculum that integrates Alaska Native knowledge and values with Western mathematics and science; and encourages parents to support the academic pursuits of their children. Secondary camp objectives relate to students' cultural and spiritual development and the creation of a network of students interested in science education in Alaska. The academic component of the camp required students to complete a science project following the scientific method and specific guidelines for writing up the report. The cultural component required students to interact with Elders daily, consult and interview Elders about their science projects, complete various traditional projects under guidance of Elders, and learn traditional social rules of behavior. Students found that in most cases the knowledge and experience of the Elders complemented, confirmed, and surpassed the quality and depth of information found in either the library or Internet. The grand prize winners in the Kodiak and Fairbanks AISES science fairs, which are open to all rural, middle school students in Alaska, were former participants of these science camps. (Contains 25 references.) (TD)

**ALASKA NATIVE ELDERS'
CONTRIBUTION TO EDUCATION:
THE FAIRBANKS AISES SCIENCE
CAMP**

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Alaska Native Elders' Contribution to Education: The Fairbanks AISES Science Camp

“Elders are the first teachers and the keepers of cultural knowledge. Traditionally, they are the leaders for the villages. ‘Respect the leaders’ is a rule repeated often to children as they are growing up.”

Dr. Claudette Bradley, Site Coordinator

“I found it humorous that these Alaskan kids enjoyed singing along with loud rap music while completing their birch wood canoe projects.

I asked one of the students whether she knew that this music was created by African American youth and whether she thought this was a little odd that this was the groups’ favorite music. She replied, ‘So? We like this music.’”

Dr. María Elena Reyes,
Camp teacher, Summer 1999

Elders as Consultants and Teachers

Because of Alaska’s educational history, it is especially important that Alaska Native children learn from the Elders. Schooling for Alaska Native students has largely been designed and implemented by non-Alaskans from the ‘lower 48.’ In most cases, the public school curriculum even today does not reflect Native values, culture or experiences.

Until the Nelson Act of 1905, which mandated compulsory-attendance public schools, religious mission

schools provided schooling for children in bush Alaska. It wasn't until 1975, that students in bush Alaska, primarily Alaska Natives, had to leave their homes and villages to attend not-very-effective boarding schools to complete a secondary education. As a consequence, the normal cycle of transmitting cultural traditions, skills, and values to this generation, who are now middle-aged, was broken.

When Dr. Bradley was asked in 1995 to develop a series of summer camps in Alaska, she used the model she followed the model she had created for Monument Valley High School Navajo students in Utah. At Monument Valley, she studied the Navajo culture and noted their critical role in designing Navajo crafts (See Clemens, 1995). For this reason, she had involved Elders whenever possible. Dr. Bradley included Elders as consultants in developing the camps' curriculum, in providing spiritual leadership during the camps, and in judging students' final projects.

Asked to share their vast experience and formidable skills in traditional Navajo culture, Elders were also asked to serve as cultural informants and research resources for

students. Having Elders involved facilitated the objective of having the camps reflect the culture of the region. In addition, the Elders were asked to be available to assist in resolving protocol issues, in teaching Native crafts, in supporting the development of literacy skills in Navajo, and in sharing stories and knowledge of the culture.

At the Fairbanks AISES Summer Camp in 1997, Alaska Native Elders were surprised to be asked by students questions about science during the camps. They did not at first realize that they had something valuable to teach especially in an 'academic area' like science since they did not have a formal education.

According to Kawagley (1995), "The original Yupiaq based their philosophy and lifeways on maintaining and sustaining a balance among the human, natural, and spiritual worlds. They made their winter and summer settlements a part of nature, disturbing the environment as little as possible." Traditionally, science in fact was an important part of learning to live and to survive in a hostile environment for Alaska Natives.

Background

Funded by the American Indian and Engineering Society [AISES], the Alaska Rural Systemic Initiative, and the University of Alaska Fairbanks, the Fairbanks AISES Science Camps were created in 1997. From 1997 to 1999, the camps have served over 70 middle school Iñupiat and Athabascan students from eleven schools districts from the interior and the Arctic regions in Alaska. For 1998 and 1999, the site of the camps has been the Howard Luke Spirit Camp located outside of Fairbanks, one of Alaska's two major urban centers. This site also placed the camp near the research resources available at the University of Alaska Fairbanks.

The Fairbanks AISES Science Camp was designed for middle school, Alaska Native students from eleven school districts. The primary objectives of the camp are to:

- Enable students to learn from Native Elders while completing hands-on, science projects;
- Stimulate interest in mathematics, science, and engineering among Alaska Native students;

- Increase students' confidence and knowledge in mathematics and science;
- Provide a curriculum that integrates Alaska Native knowledge systems and values with western mathematics and science;
- Encourage parents to support the academic pursuits of their children.

These objectives address and are consistent with the “Alaska Content Standards,” the “Alaska Cultural Standards for Students,” the “Alaska Cultural Standards for Educators” (Alaska Department of Education, 1998; Alaska Native Knowledge Network, 1998). These objectives are also consistent with the National Science Standards as developed by the National Research Council in 1996. As outlined by the Council, the objectives addressed in the camps include the Science Education Program Standards, the Science Teaching Standards, and the Science Content Standards.

Secondary objectives include to support student development in a culturally appropriate manner, to strengthen students' cultural identity, to address students'

spiritual needs, and to develop a network with students interested in science education in Alaska.

Students who applied to the camp were selected based on their academic record; teacher recommendation/s, and a written essay. In addition to these criteria, committee members making the selection worked to insure gender balance among selected students. For summer of 1999, nineteen students from Anchorage, Buckland, Barrow, Beaver, Arctic Village, Fort Yukon, Galena, Kotzebue, Minto, Manley Hot Springs, and Fairbanks attended the camp.

Since the camp's initiation, Dr. Bradley has been the camp's site coordinator. Her association with AISES National goes back to 1985, prior to completing a doctorate from Harvard in 1987. In addition to serving as the Fairbanks AISES Science Camp site coordinator, she is also associate professor of mathematics education at the School of Education at the University of Alaska Fairbanks.

Dr. Bradley is the person credited with designing the camp, implementing the camp's curriculum, and involving Elders in a substantive way as teachers and

spiritual leaders, thereby acknowledging their role as keepers of cultural knowledge for Alaska Natives. Dr. Bradley first began including Elders in this way at Monument Valley's 'Ndahoo'aah Summer Camp in Utah when she worked on developing the camp's curriculum.

Upon studying and observing Navajo rugs with various geometric designs, Dr. Bradley reasoned that the rugs' geometric designs, with their right angles, could provide an excellent basis for LOGO projects. The camp's main academic objective was to encourage students from Monument Valley in grades 6-12 to learn LOGO, a computing language based on the cognitive theories of Piaget and artificial intelligence theories of Norbert Weiner.

Because she knew that the only valid teachers of Navajo rug making were Navajo Elders, Dr. Bradley suggested to Monument Valley administrators that they employ Navajo weavers to teach rug weaving during the project. In addition, since Navajo beadwork and basket designs were also based on geometry, it became necessary

to employ Navajo bead makers and basket-makers as teachers.

As a consequence of these decisions, students at the 'Nadahoo'aah Summer Camp spent significant time at the camp learning these skills from Navajo Elders who spoke to them only in Navajo. Students' instructional time was also spent in the LOGO Lab working with the strictly English-speaking computer staff in developing Navajo designs on the computers. Under these instructional conditions, students, perhaps for the first time, were learning in a supportive, bilingual, cross-cultural, educational environment.

As the camp progressed, many school administrators were surprised by the program's immediate success. The students, parents, and community leaders loved the program. The Elders were delighted to teach the crafts, claiming the young people were not learning these crafts at home. The principal was pleased to see the high retention rate and enthusiastic interest among students. She also applauded the positive involvement of parents and

community members in such a cost-effective and academically successful program.

Camp Curriculum

In developing the Fairbanks AISES Science Camp, Dr. Bradley identified two equally significant components for the camp's curriculum. The first major component of the camp was the academic component that required students to complete a science project following the scientific method and specific guidelines in writing up the project.

The second major component of the camp was the cultural component that required students to:

- (1) Interact on a daily basis with Elders;
- (2) Consult and interview Elders about their science projects;
- (3) Complete various traditional projects, under the guidance of Elders, in addition to their science project; and
- (4) Learn and observe traditional social rules of behavior, especially in showing respect for Elders.

These goals addressed students' academic and developmental needs.

Male only and female only 'Talking Circles' were held at every camp. These provided an opportunity for students to bond with each other. The Talking Circles also provided students with an occasion to observe adults—often from greatly varying social, economic and educational backgrounds—interact with one another in a positive way.

Meeting students' academic needs in science was easy. In Alaska, summertime offered students an opportunity to explore and to begin research on the abundant plant life, wild life activity, environmental phenomena, social science research, and other scientific questions.

Most of this research could not be conducted during students' regular academic year due to Alaska's harsh winter conditions. At the camp, students were provided access to elders, university professors, teachers, resident advisors, other support staff, library resources, Internet resources, computers, and project materials and equipment.

Under these ideal conditions, students were free to conduct science research in a supportive, cross-cultural

setting. Completed projects were required to be scientifically sound and to incorporate elders' knowledge. All students were required to conduct, document, and write up ethnographic interviews with one or more elders regarding their research topic.

To complete the projects, a computer lab was available to students at the camp. The lab, located in the Elder's Hall, had 6 Thinkpads and one Color Ink Jet Printer, which were donated to the camp by IBM. Two Solar Panel Powered Battery Generators supplied electrical power to the computers and printer. At the lab, one or more teachers were always available to students.

During the camps, teachers assisted students in a variety of tasks, such as developing a research design; creating graphs and data charts; conducting the science experiment; analyzing data; preparing the Elders' interviews; writing up the projects with a bibliography; and designing a display board showcasing each project. Teachers conducted various additional projects, facilitated field trips, assisted in the smooth functioning of the camp, and participated in field trips and talking circles.

Additionally, they met on a daily basis with the site coordinator, resident advisors, and the Elders.

As part of an on-going assessment plan, the site coordinator met on a daily basis with teachers to evaluate the overall effectiveness of the program, to check on each student's individual progress in the development of their projects, and to determine what additional resources students needed to complete their projects. For example, the site coordinator requested a balance scale from Dr. Larry Duffy of the UAF BioChemistry Department. On another occasion, a student was escorted to the Alaska Fish and Game Department to collect data on salmon runs over the last 20 years, information she needed to complete her project.

In completing projects, the knowledge and experience of the Elders complemented the information students found using typical research resources like the library and the Internet resources. Often, students found that Elders' observations confirmed existing research. In most cases, Elders knowledge surpassed the quality and depth of information found in either the library or Internet

resources providing students with an alternate framework for their projects.

On the final day of the camp, a potlatch or banquet marked its closing. At this time, the site coordinator, Elders, teachers, students, parents, community people, and other invited guests celebrated students' accomplishments at the camp. Invited guests toured the camp, enjoyed the potlatch, and listened as the campers presented their science projects. The potlatch celebration closed with a giveaway and with Athabaskan singing and dancing.

The Science Fairs

Students who attended the Fairbanks AISES Science Camps were given an opportunity to enter his/her project in a regional science fairs scheduled by the AISES Initiative. Elders evaluated science projects in four areas: (1) project's capacity to maintain Native Values of the Region; (2) project's importance to Native culture; (3) its importance to village life; and (4) its contribution to the understanding of land and assets of Village and Native corporations.

The teacher/scientists evaluated projects on their mastery of the scientific method; on its contribution to science; on its creativity and thoroughness of the project, and, on the student's presentation of the project. The teacher/scientist judges often spent time discussing the project with the student, offering valuable advice that would improve the project.

When asked about the difference between elders and teacher/scientist judges, a Noatak student, who participated in the Fairbanks AISES Camp for two summers, said, "Elders always admire the students and make them feel like they can do more" (Webber-Werle, 1999).

Dr. Bradley proudly states that the Grand Prize Winners in the Kodiak and Fairbanks AISES Science Fairs, which are open to all rural, middle school students in Alaska, were former participants of the AISES Science Camps in Kodiak and Fairbanks in 1997, 1998, and 1999.

Karen Yamamoto, Director of Pre-College Programs for AISES National, stated, "The Science Projects from Alaska are significantly different from the

projects we generally see. The staff of AISES National would like to see more projects from lower forty-eight attempt to develop science projects like the Alaskan projects” (1998).

Elders Contributions to Student Projects

In summer of 1999, twenty-two projects were completed at the Fairbanks AISES Science Camp. Topics covered included soil erosion in Alaska, spruce wood as insulation, salmon, caribou antlers, heat waves, spruce beetles, water evaporation, estimation by Elders, and the Golden Ratio.

Two student projects were titled: (1) Which is Warmer: Wolf Fur or Caribou Fur, and (2) Birds in Howard Luke’s Camp. To complete these projects, students performed typical library and internet research. In addition, each consulted Elders at the camp for additional information.

Margaret Tritt, an Elder from Arctic Village, provided the student doing the fur project with a piece of wolf and caribou fur. Margaret uses both types of fur in her

sewing, especially when sewing 'mukluks,' traditionally made boots. She discussed both types of fur with the student offering him her opinion about his question. After conducting his science experiment, this opinion was confirmed by the results: caribou fur is warmer.

The student doing research on birds at the camp was told the names of the birds that were flying around the camp and the behavior of each. She made a data sheet of the list provided by the Elders and then counted several times a day all the birds she could observe. However, the names that had been provided by the Elders were not English names but Athabascan names. In displaying her project, the student used both names in identifying the birds. [In Alaska Native culture, Athabascans identify birds by their behavior.]

In conclusion, at the camps, Elders contributed both to students' personal development and to their academic development. In adding and extending students' knowledge of science as they learn it in the traditional classroom, they have made an important contribution to students' appreciation of science and of their culture. This way of

teaching science has extended into some classrooms in Alaska. Deborah Webber-Werle, an elementary teacher from Noatak, Alaska in the Northwest Arctic Borough School District, recently discussed the incorporation of Elders in the science curriculum. She stated:

Everyone looked for ways in how to successfully include elders into the science curriculum. The AISES science Camps and Fairs showed us how to do it...In the end of the movie, "To Show What we Know," an Iñupiaq Native woman said, 'We hesitate to call our native ways of knowing science, but what our elders have taught us is science' (Webber-Werle, 1999).

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