

## **Engaging Native Alaskan Students and Their Community in Local Hot Springs Research: A Project Designed to Increase Geoscience Education**

**Wendy F. Smythe**, Oregon Health Science University, Environmental and Biomolecular Systems, 20000 NW Walker Rd., Beaverton, OR 97006-8921; [smythew@ebs.ogi.edu](mailto:smythew@ebs.ogi.edu)

**Sherry L. Cady**, Associate Professor, Portland State University, Department of Geology, 1721 SW Broadway, 17 Cramer Hall, Portland, OR 97201; [cadys@pdx.edu](mailto:cadys@pdx.edu)

Cultural heritage of Alaska Native tribal groups is based on a knowledge of, and experience with, the natural world. Traditional ecological knowledge encompasses an understanding of habitats, ecological communities, cycles, seasonal variation, and the history of plant and animal species. Despite these cultural traditions, Native Americans are the most underrepresented minority in science. Our project seeks to engage Haida Alaska Natives in the geosciences by offering them an opportunity to collaborate in a variety of field and laboratory, inquiry-based projects we develop at hot springs in their local area.

Our project has four main aims: first, we are developing a curriculum that brings geoscience to the students from a culturally relevant perspective. Science curriculum modules founded in “western” ideologies need to reflect traditional ecological knowledge that has been used by the community for hundreds of years, and was developed for their survival as hunters and gatherers. Second, the curriculum developed during the course of this project will be translated by local linguists into the Haida language. The Haida language is an endangered dialect, and though few individuals fluently speak or read Haida, this will be the first time science curriculum has been written in the native language. Translating the curriculum to the native language will also reveal the native perspective on scientific concepts, and help preserve the language. Third, we are working in collaboration with the teachers to obtain additional resources they need to facilitate the integration of new scientific concepts into their current curriculum. Fourth, we are emphasizing current research topics and techniques, and presenting them in such a way that the student can easily grasp how such skills can be used in the context of future career possibilities.

Building relationships with the schools, families, and tribal elders will be crucial to attracting Alaska Native students to the geosciences and encouraging them to pursue a college education. Like all students, native students will benefit from long-term productive interactions that build their confidence in the sciences. Students will be able to experience a mixed-methods approach in our curricula, which will involve lectures, and hands-on field and laboratory inquiry-based activities. The majority of the students we will work with are first-generation college students whose parents are unfamiliar with the college application process and the range of post-secondary education opportunities available for their children. Given that potential first-generation college students make decisions about attending college before they get into high school our efforts will include working on part of the project with middle-school students. A strong relationship with the community is important in providing a positive support system throughout a student’s educational career.

Native American students are two times more likely to attend two-year tribal colleges than four-year universities, and native students who develop mainstream social competencies are most likely to be successful in college. In native villages, professional staff are predominately non-Native (95% state wide in Alaska), with an annual turnover rate of 30–40%. Students will be introduced to a variety of possible future career opportunities related to the field of geoscience, most of which will be interdisciplinary (geology, biology, and chemistry), in an effort to encourage them to become teachers and scientists that could return to the village with new knowledge-base resources that they could transfer to the next generation of students.

Students will gain an understanding of and appreciation for the geosciences from a variety of methods, which include lectures, hands-on field- and laboratory-based exercises, and collaborative interactions with a multidisciplinary group of scientists. Students will collaborate with us on an actual research project, and travel to a culturally-relevant field site that has a carbonate-depositing hot spring. We will exam the impact of the local geology on the spring chemistry, and study the spring microbiology and mineralogy. Local tribal and community members will help reveal more about the ecology of the surrounding area, and discuss what they know about how activity at the hot springs has affected the local fresh water streams and nearby fishing grounds offshore.

In summary, the project includes the following goals:

1. Recruit and retain Alaska Natives into fields that involve the geosciences.
2. Promote geoscience education to Alaska Native students, parents, teachers, and the community.
3. Increase the number of Alaska Native students majoring in the geosciences, or improving their academic performance in the geosciences, or both.
4. Enhance working relationships between Alaska Native students and various federal agencies (e.g., National Science Foundation, NASA, US Department of Agriculture, Environmental Protection Agency, Department of Education).
5. Introduce students to career opportunities and the art of scientific investigation by having them participate and collaborate in field and laboratory research projects.
6. Provide an overview of the types of professional ethics and expectations the students should have when considering scientific career choices (e.g., discuss the principles of scientific integrity, responsible conduct during research investigations, and the need for high ethical and professional standards).
7. Develop and implement a comprehensive assessment strategy that will allow us to evaluate qualitative and quantitative aspects of the curriculum, and enable changes and modifications to the program.

To achieve these goals, we will establish an interdisciplinary collaborative team at Portland State University and Oregon Health Science University for the purpose of enhancing science education and building professional and personal partnerships between researchers and rural Alaska Native communities.

## Summer workshop

A workshop taught at Hydaburg, Alaska, on Prince of Wales Island will provide the participants with hands-on training in the use of specific laboratory equipment. Field- and laboratory-based exercises will be used to assist with the development and dissemination of educational materials. The workshop will provide inquiry- and discovery-based learning opportunities that can be modified and used throughout the following academic year in the classroom. Daily activities will focus on the introduction of new scientific topics, completion of the previous day's activities, and group discussions. We will strive to develop guidelines for integrating the activities into the classroom at various age levels. Community elders will visit the students each day, speak about the importance of education, and encourage students to pursue higher education goals.

A web portal based out of Portland State University will be used for post-workshop discussion, questions, and workshop feedback and assessment. Participants will be given the opportunity to communicate via a blog initiated during the workshop. The blog will be used to gauge how students feel about how their participation in specific activities has influenced their perception of geoscience and how they may use the knowledge gained.

Long term goals of the project include hosting a summer internship for some of the students at Portland State University and the Oregon Graduate Research Institute, which would allow them to gain additional "bench" and microscopy skills, and experience in a professional laboratory setting. It is extremely difficult for native students from rural communities to integrate into mainstream culture successfully, especially in a highly-populated metropolitan or urban setting, to which some attribute the high college dropout rates among native students. Summer internships would expose students to current research methodologies, and provide them with short-term exposure in an urban university setting, an opportunity we hope will help recruit and retain native students. Feedback from the summer internships will also provide us with a native student perspective on what types of challenges they feel they would face by leaving their community to come to a metropolitan- or urban-based university setting.

The multidisciplinary field of geoscience presents an excellent platform upon which to introduce young minds to the excitement and wonders of science. Geoscience encompasses disciplines as diverse as geology, microbiology, biochemistry, physics, and chemistry, appealing to a wide population of young scientists. Geoscience education presents an opportunity to attract promising students to fields they can pursue that would allow them to contribute back to their communities.

## References

- AAAS [American Association for the Advancement of Science]. 1993. *Benchmarks for Science Literacy*. New York: Oxford University Press.
- . 1989. *Science for All Americans*. New York: Oxford University Press.
- National Commission on Excellence in Education. 1983. *A Nation at Risk: The Imperative for Educational Reform*. Washington, D.C.: U.S. Government Printing Office.
- NCTM [National Council of Teachers of Mathematics]. 1989. *Curriculum and Evaluation Standards for School Mathematics*. Reston, Va.: NCTM.

- NRC [National Research Council]. 1989. *Everybody Counts: A Report to the Nation on the Future of Mathematics Education*. Washington, D.C.: National Academy Press.
- Pearsal, M.K., ed. 1992. *Scope, Sequence and Coordination of Secondary School Science. Vol. 1. The Content Core: A Guide for Curriculum Developers*. Washington, D.C.: National Science Teachers Association.
- SCANS [Secretary's Commission on Achieving Necessary Skills]. 1991. *What Work Requires of Schools*. Washington, D.C.: U.S. Government Printing Office.
- Laughlin, W. N.d. Recruitment of native students—A counselor's perspective. On-line at [www.whitneylaughlin.com/workshops/recret.html](http://www.whitneylaughlin.com/workshops/recret.html).
- Erickson, J.A., and J.B. Anderson. 1997. *Learning with the Community: Concepts and Models for Service-learning in Teacher Education*. Washington D.C.: American Association for Higher Education.
- Ward, H. 1999. *Acting Locally: Concepts and Models for Service-learning in Environmental Studies*. Washington D.C.: AAHE.
- ECS [Education Commission of the States]. 2001. *Service-learning and Standards: Achieving Academic Excellence*. Denver, Colo.: ECS.