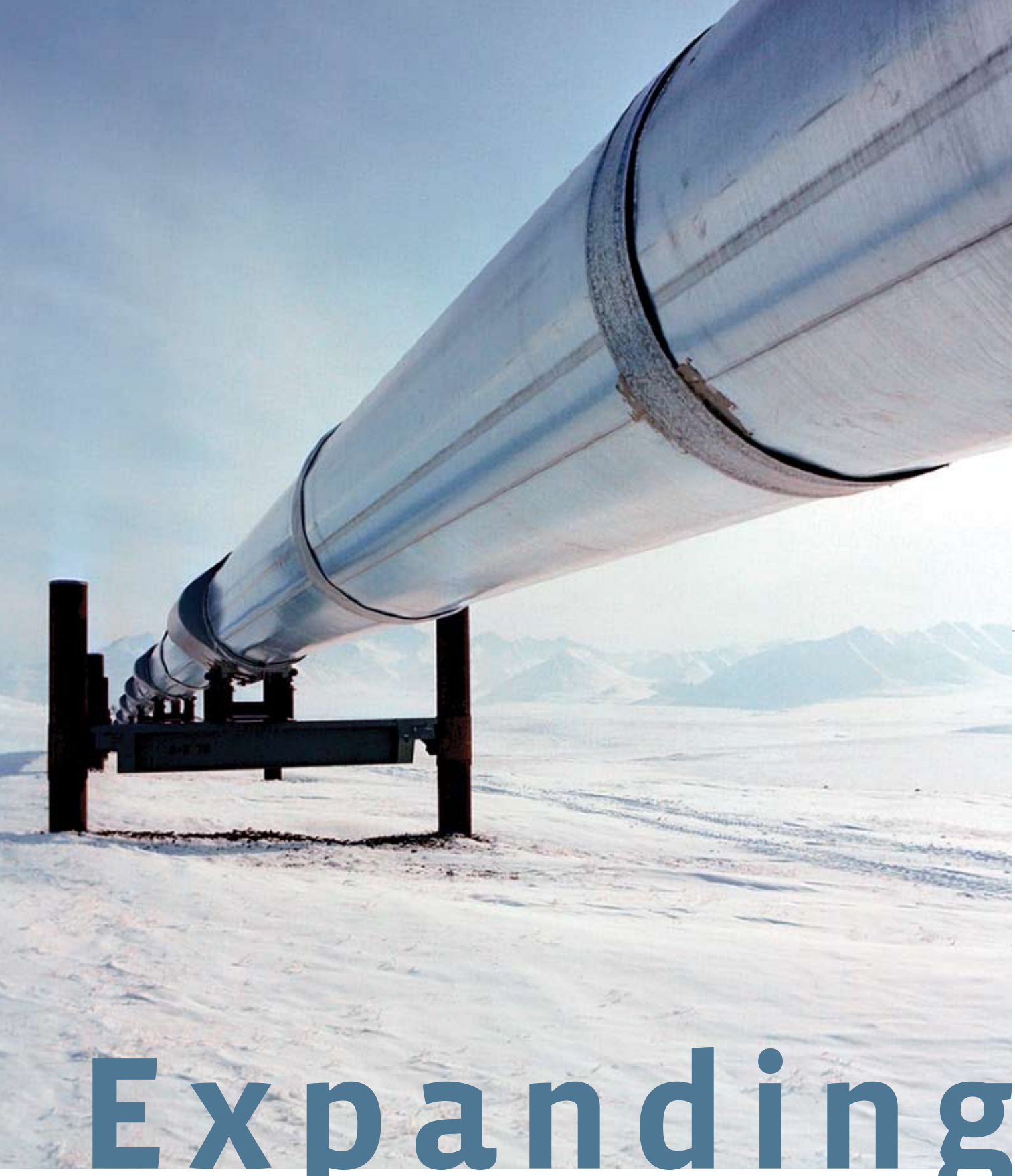

Expanding the Engineering Pipeline

The University of Alaska Anchorage is empowering native students to succeed as engineers and scientists and providing a source of technical talent for local industry. It's a model that's being replicated with indigenous students nationwide.

BY EVA KAPLAN-LEISERSON

In Alaska, like other areas of the country, there aren't enough engineers to go around. Oil companies must often import staff from the "lower 48," which can cost hundreds of thousands of dollars in recruiting and relocation costs. And then, many employees quit after just a couple of years, unable to adjust to the cold and dark environment.

At the same time, many of the native people of Alaska struggle with low-quality education and eke out a living in traditional industries such as fishing. A suite of programs developed at the University of Alaska Anchorage, however, is creating a win-win situation, helping some Alaska Native students live their dreams of becoming engineers and scientists.

Developed by Herb Schroeder, associate dean of UAA's engineering school, the Alaska Native Science and Engineering Program includes a pre-college program for high schoolers, a summer bridge experience for entering freshmen, a set of retention strategies for university students, and continuing services for graduate students.

The model has been so successful in attracting and retaining indigenous engineering and science students that five other colleges and universities in Alaska, Hawaii, and Washington have implemented programs based on the ANSEP model. After an October conference in Anchorage, seven more in Washington, Arizona, Colorado, North Dakota, and South Dakota have committed to doing so.

At the six colleges and universities that have implemented ANSEP-based retention strategies, 70% of students have graduated or remain in the program. Among students who have completed the summer bridge program, that number shoots up to 85%. This compares to National Center for Education Statistics showing a six-year graduation rate of 36.5% for indigenous students in all disciplines.

Low Expectations

The story of ANSEP starts in the early 1990s, when Schroeder traveled to "honey bucket" villages in rural Alaska to research sanitation. In these villages, citizens haul buckets of sanitary waste to a town dump site, often spilling the contents en route, spreading pathogens, and creating health problems.

Schroeder noticed communication problems between the Alaskan natives in the communities and the engineers from the public health service. "I decided you could mitigate some of the problems by having native engineers," Schroeder says. "In the whole two years I worked on that project, I never met a single native engineer." So the self-proclaimed "white guy" returned to the university determined to address the shortage of Alaska Natives who see engineering as a potential career path.

But the road was not a smooth one. At UAA there was a "widely held belief that native people couldn't do math and science," he says. And when he decided that he needed to reach out to high school students to ensure they were prepared for the tough college engineering curriculum, he faced similar views from high school officials.

The attitudes Schroeder encountered were representative of what he calls "systematic subjugation" of indigenous students, in which they're not considered college material. When Schroeder talked to high school officials, he got responses such as, "These students aren't cut out for college. They want to stay here [and] ride snow machines." And, "If we offered [higher-level math and science] courses, no one would take them and those that would would fail."

Years later, Schroeder would win the Presidential Award for Excellence in Science, Mathematics, and Engineering Mentoring for developing the ANSEP program. In presenting the award in 2004,

PHOTO CREDIT: EPA/CORBIS

LEARNING TO PUT TOGETHER A COMPUTER GIVES AN ALASKA NATIVE HIGH SCHOOL STUDENT THE VISION FOR A CAREER IN SCIENCE OR ENGINEERING.

President Bush said something to Schroeder that perfectly summed up the resistance he encountered: "Under-represented minorities in this country suffer from the soft bigotry of low expectations."

For Alaskan natives, low success rates in higher education were the root of those expectations. But the ANSEP program has demonstrated that it's not that indigenous students aren't cut out for college, but that their prior education leaves them ill-prepared.

Diane Kaplan, president and CEO of the Rasmuson Foundation, a major supporter of ANSEP, explains that the quality of education in rural villages is poor. "Kids from small villages who might even be valedictorian in their high school class arrive at university so ill-prepared for success that they often flunk out in the first year," she says. "Imagine how devastating that's got to be to someone's morale."

What the ANSEP program has proven, Kaplan adds, is that once placed on a level playing field with students from larger towns and cities, indigenous students can not only survive but thrive in higher education.

"It's not because they're dumb, not because they're not motivated or don't have potential or aren't interested," says Kaplan. "It really seems that the problem has been…that they are ill-prepared to be successful, and have had people tell them they're not going to be successful, and they're believing it after a while."

Says Schroeder: "We've turned all those beliefs totally upside down."

Building the Model

In 1995, Schroeder started the university retention portion of his program, working with two native students to identify what they would need to feel welcome and be successful. Schroeder's weekly meetings with the students expanded into study groups, and he eventually wove in internships to help students explore different engineering jobs.

Today, retention efforts include co-enrollment of native students in classes to support each other; twice-weekly group study sessions led by more-advanced peers; weekly team-building and networking meetings with students, faculty, alumni, and industry partners; and summer internships at partner companies. If students participate in all components and keep a 2.0 GPA, they can earn scholarships to cover the majority of their schooling costs.

Teamwork is essential to the program and illustrates its primary belief. "Everything we do is based on the fundamental indigenous value that community comes before the individual," says Schroeder.

But the associate dean found that he was still doing a lot of "damage control" with students unprepared for university courses. After coming across a summer bridge program at the University of Washington that brought high school graduates to the university campus before they started school there, he launched a similar program at UAA in 1998.

In the nine-week bridge program, students take two hours of pre-calculus class in the mornings; work an internship with industry partners like BP, Alyeska Pipeline, or ConocoPhillips for six hours during the day; and then do more math with peer tutors in the evening. On Friday afternoons students attend brown-bag sessions with industry professionals to learn about their jobs, and on the weekends students can participate in group activities like go-carting and laser tag.

Although the program was successful, Schroeder found that students were still too far behind. So in 2002, he added the pre-college program for high schoolers.

Flying to Kotzebue, on Alaska's west coast and 33 miles north of the Arctic Circle, Schroeder met with 10 high school juniors that friends had told him would be successful in university studies. He brought parts for 10 computers and offered to teach the students how to build and operate the machines. The requirement was that they had to take trigonometry in high school.

All 10 students were eager to participate, but there was one catch: The school didn't offer the class. Schroeder urged the students to petition the principal for it. Now the school offers trigonometry, physics, and chemistry, Schroeder says, and its students are graduating from UAA with engineering degrees.

Schroeder's idea is now a reality in 43 high schools in Alaska, Hawaii, and Washington. If students take trigonometry, physics, and chemistry, build a computer one year, and teach another student to do so the next year, they're rewarded by being allowed to keep the computer they built. Initially funded by NSF, the program is now supported by industry partners.

The program gives students not only a vision of what they might become, says Fran Ulmer, interim chancellor at UAA, but also the necessary tools and skills to achieve that goal. Schroeder, she says, has "opened up the doors and windows of people's lives in a very powerful way."

Why It Works

In the 10 years before ANSEP, UAA's engineering program graduated three native students. Now, in the 2007–2008 school year alone, there are more than 350 native engineering students at UAA, University

of Alaska Fairbanks, Alaska's Kuskokwim Community College, the University of Washington, the University of Hawaii Manoa, and Hawaii's Kapiolani Community College. About 200 more indigenous students are studying science at those schools.

What are the reasons for the model's success? The suite of programs that prepare students for university-level work is key. But equally important is the atmosphere that the retention program creates. For students and partners in ANSEP, it's a feeling of family and home.

Indigenous students come to study far from their villages and people they know, and they land in an urban environment vastly different than what they are used to. Through group study sessions; Friday afternoon pizza meetings; and organized activities like bowling, snowboarding, and rock climbing, ANSEP reinforces its group dynamic and creates bonds between participants and with faculty, alumni, and industry mentors.

The ideas of family and home are much a part of the 14,000-square-foot building that serves as ANSEP's headquarters. The ANSEP building was designed to look like a canoe and is decorated with indigenous art. Built with industry and foundation support and money from the state of Alaska, the building opened in October 2006. It is a place, Schroeder says, where native students can feel comfortable and "be native."

In addition to recitation rooms and offices, the building has a space for native dance performances and a kitchen where father-figure Schroeder can often be found on Sundays cooking up a meal for the students.

But even before the building opened, ANSEP was providing students with a sense of family. It is that feeling of community and belonging to which Matt Calhoun, a graduate student at UAA and the first ANSEP graduate, credits his academic success. Prior to joining as a sophomore, he says, "I just felt alone and distant to the point where I almost didn't continue college."

But ANSEP students, who share similar backgrounds and goals, support and help each other. Jenny Jemison, a senior at UAA who serves as a recitation leader for lower-level students, jokes, "I'm graduating in the spring, and I feel like I should have 70 other names on my diploma."

PHOTO CREDIT (BOTH PAGES): ANSEP

STUDENTS IN THE ALASKA NATIVE SCIENCE AND ENGINEERING PROGRAM GATHER IN FRONT OF THE CANOE-SHAPED BUILDING THAT SERVES AS THE PROGRAM'S HEADQUARTERS AS WELL AS A METAPHOR FOR THEIR JOURNEY TO A NEW LIFE.

This team approach is perfect for preparing future engineers, explains junior Kelvin Goode, since much of engineering work is done in teams. "This program is preparing us for the engineering world from the moment we step into college because they emphasize teamwork and group thinking," he says.

Companies that host student interns and hire graduates believe that ANSEP students are better prepared than the average student. Kristi Acuff, senior vice president of employee and external relations for Alyeska Pipeline Service Company, says participants are high-caliber workers with a good work ethic. "ANSEP students just excel," she says. "We've been very impressed with them."

With an internship every summer, students are highly prepared when they start their professional careers. Every graduate so far has gone on to work for one of the 50 industry partners, Schroeder says. And when the British energy company BP recently recruited at UAA, Schroeder reports, seven of the eight people picked were ANSEP students.

"These students are competing with the best and the brightest from the whole world," he says. "Because they're BP, they're not going to lower their standards for the talent they bring into the company."

Another sign of success is that non-indigenous students are now joining the program, attracted by ANSEP's team dynamic and elite reputation. ANSEP does not discriminate and welcomes them.

Further Application?

As the ANSEP model spreads beyond UAA and Alaska, some believe its impact could go even further.

"I think he's created a really good educational model for retaining students into an educational program," says Carolyn Smith, operations manager at NANA Development Corporation, an ANSEP partner. UAA's Ulmer says the school is discussing the applicability of the model for growing the next generation of K–12 teachers.

Kaplan believes the ANSEP strategies could be applied to many different disciplines. "It's not really about engineering," she says. "It's about having an attitude that the students can be successful and giving them the support they need."

She continues, "What Herb has created, it's not rocket science. It's really common sense and commitment."

Says Acuff about Schroeder's eventual retirement: "The biggest hope is that he trains somebody right behind him who has the same heart, because he's got an awfully big heart towards this program and it's made it very successful." PE