Designing Our Community: A Report on Progress Toward Program Goals of Recruiting and Retaining Native American Students in Engineering

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The Designing our Community (DOC) program at Montana State University (MSU), which is supported by the William and Flora Hewlett Foundation, has three goals: (1) Increase the motivation and pre-entry academic preparation of Native American students who want to study engineering, (2) Help shape the engineering, engineering technology, and computer science workforce by increasing the number of Native American students graduating from the College of Engineering, and (3) Improve access to quality engineering and technology to rural and underserved populations by returning highly educated professionals to these communities.

We have made progress toward these goals. For example, autumn 2004 we had 20 new students in engineering, more than twice the number we generally have. In this paper, we focus on our activities related to graduating more Native American students. We describe the details of our retention activities, including (1) our first summer Bridge Program for new engineering students; (2) the contract we developed to help students understand the importance of the DOC program and to take responsibility for participating in the program; (3) the monthly stipends and how they have benefited students so far; and (4) our tutoring and mentoring efforts. We also talk about how we have tried to educate students about other MSU support programs. Finally, we discuss some of our initial findings in regard to the success of individual program activities.

We hope that the full range of support activities offered by Designing Our Community will encourage our 20 new Native American students and help them complete engineering degrees.

Background on Montana and Montana State University

The 2000 U.S. Census reported the population of Montana at just under a million people. Ninety one percent of Montana's population is white; however, the largest minority group is Native American. Native Americans make up 6.4 percent of Montana's population, and these Native American populations are growing. This increase is most notable in K-12 age groups in Montana's Public School systems. Public school enrollment has fallen in Montana since 2000 as the majority (white) student population decreases; however Native American populations are on the rise. According to the Montana Office of Public Instruction, Montana's Native American population comprises 10.9 percent of the total student population. At the elementary level they represent 11.7 percent, and at the high school level 9.2 percent of the population.

As the state's only land grant institution, MSU is dedicated to providing access to education for all of Montana's citizens. The land grant mission gives reason and importance to programs that support Native American students at MSU. The university's role and scope statement states that "Montana State University, as part of its land grant mission, takes an active interest in enhancing the educational and professional opportunities for all protected classes and has a special dedication to developing progressive options for Montana's Native American population." The MSU five-year plan for the student body is to increase diversity, for example by increasing Native American student enrollment by 50 percent. Training Native American students in engineering and technologies meets this goal and mission. Students trained in technological fields can provide reservation communities with much needed expertise. The College of Engineering (COE) is developing programs that provide a pathway for Native American students to achieve training in engineering and technology and provide a network of opportunities to enter the corporate world or return to their reservations.

Montana ranks in the top 15 states in graduating Native Americans earning bachelor degrees in engineering and ranks in the top 5 states graduating Native Americans with associate degrees in engineering curricula. The COE looks to capitalize on the close geographical proximity between MSU and many of the state's Native American population centers. For example, the COE has begun to further partnerships with tribal community colleges on all of the Native American reservations in Montana. MSU offers ten undergraduate degree programs and options in engineering. There is no other single campus in Montana, Idaho, Wyoming, or the Dakotas that offers comprehensive (B.S. through PhD) degrees in computer science, engineering and mathematics, as well as the B.S. and M.S. degrees in engineering technology. The COE at MSU is targeting the enhancement of Native American education as a top priority over the next five years.

Enrollment data for Native American students shows that they have comprised 1.5 to 2.0 percent of the total enrollment in the COE for the past ten years. Autumn semester of 2004, we saw a large increase in Native American student enrollment in the COE, hopefully because of our recruitment efforts during the 2003-2004 academic year. The number of new incoming freshmen and transfer students doubled from the previous years, and Native American students now comprise 2.5 percent of the total enrollment.

Bridge Program

We recognize that all students often find the transition from their home community and culture to be overwhelming. Native American students in particular often come from smaller rural communities and can find a large campus to be daunting. The first step in our retention program, the summer Bridge Program, is designed to alleviate and smooth the transition for Native American students.

The DOC summer Bridge Program is designed to (1) provide students with a welcome and an introduction to the Native American community within the COE and campus; (2) help them begin to build their campus, academic, and community connections; (3) encourage mentoring, support systems, and networking within the academic community of engineering; (4) provide basic tools and brush-up to help overcome common experiential barriers to academic success; (5) give new students a head start to their college experience, infusing them with confidence and foreknowledge of the college engineering experience.

The Bridge program is offered for new freshmen and transfer students immediately prior to the beginning of Fall semester. Summer of 2004, students received early entrance into their campus housing and dorm rooms, and they attended a full five-day orientation program. Students began by receiving a tour and introduction to labs and facilities in the engineering complex. Mini-courses included demonstrations of engineering design software (AutoCad and ProE) taught by Mechanical Engineering faculty and introduction to computer science taught by Computer Science faculty. Math prep courses reviewed concepts that students struggle with in pre-calculus and calculus. The program included a mini-course in writing as well as introductions to campus support programs such as the writing center. Students also received an orientation on how to access their student records and email accounts on-line. Additional work sessions included information about the campus library, financial aid personnel, study skills including note-taking, time and stress management, test anxiety, and financial management. Campus support program personnel provided programming and information on how to access their services throughout the year. Current and experienced engineering students helped facilitate sessions and served as mentors and role models. The program also included social events with current engineering students in order to help establish our mentor network.

The first year of the Bridge program was held the summer of 2004, and initial evaluation results were promising. The program appears to be meeting its objective of orienting students for their first semester by giving them some academic preparation, introducing them to other students in the program, and introducing them to MSU resources. Students rated all sessions of the Bridge Program on a Likert scale, and the three most useful sessions were math sessions, information about the campus Native American Council and student services, and computer account setup. A majority of the students indicated that the program increased their awareness of MSU resources, saying that they planned to take advantage of those resources autumn semester. The four most frequently mentioned resources that students planned to use were the MSU library, Native American Council and Student Services, and the sports facilities. A math instructor from this summer's

Bridge program remarked that one of our students in this summer's program has done very well in his Calculus II class, and he believes that the math prep sessions we offered were a big part of getting the student refreshed on Calculus so that he was able to get a good start in math.

Student Contract

At the beginning of each semester, students participating in DOC sign a contract defining expectations. The program was created to support, guide, and encourage Native American students to successfully achieve academic goals, foster career goals, develop personal life skills, and attain leadership skills.[1] Students in the DOC program are required to attend campus orientation, meet with their instructors, meet with their academic advisors, meet with the DOC staff, attend professional development workshops, and participate in social and cultural events.

Student contract requirements differ between lower-division students (freshmen and sophomores) and upper-division students (juniors and seniors). All students are required to maintain full time status (12 credits) with a minimum of a 2.5 GPA per semester. Freshmen and sophomore students enroll in the DOC seminar and must participate in the mentoring program. Juniors and seniors make presentations in the seminar, mentor a freshmen or sophomore student, and work on professional development such as planning for internships. All students in the DOC program are responsible for meeting with staff at least twice per semester, meeting with their instructors once prior to mid-terms, and completing at least one academic advisor visit per semester. They must also attend one workshop or meeting focused on personal life skills, academic enrichment, career development, or a professional student organization on campus. They must also attend one social, cultural, or special presentation event. In addition to these requirements, students must spend a minimum of 4 hours per week in the Engineering Minority Program (EMPower) Student Center and a minimum of one hour per week in a mentoring program. Students who are below full time status or below minimum GPA are on probationary status and agree to meet additional requirements such as required tutoring, participation in study groups, weekly check-in, and class attendance checks.

Tutoring is provided in math, chemistry and engineering courses such as surveying, materials science, and engineering mechanics. DOC hires upper-division students to tutor engineering and chemistry courses. Many upper-division Native American students are available in the EMPower Student Center to provide help for students in a variety of subjects. This past year, graduate students who teach math courses at MSU were hired to provide weekly tutoring and prepare review sessions prior to exams. Spring semester of 2005, DOC will be identifying common courses in order to put together study groups for students who are struggling with specific courses. Students who are on probation will be required to attend tutoring and weekly study sessions for each science and math course.

Prior to mid-term of the semester, students are required to meet with their class instructors and submit signed instructor forms to verify the visit. The instructor form allows students and instructors to discuss progress thus far including class attendance,

participation, quality of work, homework, and comprehension of material. The COE requires students to meet with their advisor once per semester prior to the next term registration dates. DOC students have an additional requirement to meet with their advisor before mid-term to visit about academic goals, current courses, future courses, internship possibilities, and professional development.

Financial Support

Native American students often face greater financial burdens in attending college than most students. Many of these students face more risk factors for succeeding in higher education such as being single parents, working part or full time, receiving less financial help from family, and being a part-time student.[2] In order to help eliminate financial barriers, the program includes a stipend for all students who participate according to the DOC contract. The stipend element of the retention program is not a scholarship. It provides a "living allowance," allowing students to decrease outside work hours or loan amounts. Students must meet our program requirements to receive the stipend, including enrollment in an engineering/computer science curriculum, maintaining a 2.5 G.P.A., and meeting requirements set forth in the student contract. Students earn $250 per month for the academic year.

A preliminary evaluation was given to students Spring 2004 following the first semester of the DOC Program. All students reported that stipends allowed more study time and most students reported that the stipend allowed them to work less. In regard to raising awareness of on-campus resources, nearly half of the students took advantage of tutoring, and nearly three quarters took advantage of some type of student service, including Department of Education/Student Support Services programs, the Writing Center, and the Math Learning Center. One of the most positive results from this evaluation was the amount of contact students were getting with faculty and advisors (some of whom are faculty). All but two students had met with a professor other than his/her advisor during the semester, and the average frequency of meetings was one per week . All but two students had also met with an advisor, and most of those students had met 2 or 3 times with an advisor during the semester. This contact with faculty is also evident in the number of students who could identify someone to whom they could go for a reference. A less positive result from this early evaluation was that only 4 of 13 students reported that they had met their academic goals for the semester. Students may have unreasonable expectations for performance in college, basing their expectations or goals on their high school performance. At meetings during autumn semester of 2004, students again set academic goals, and the DOC Assistant Director worked with them to make these goals as realistic as possible.

DOC Seminar

DOC is creating a "Learning Community" to increase student connectivity and to enhance student retention. The community is enhanced by a one-credit seminar offered to Native American students majoring in engineering, engineering technologies, and computer science. The primary objectives of the DOC seminar are:

- Increase awareness of academic and campus support, and further develop skills for college success.
- Provide an arena for peer networking, social support, mentoring opportunities and contact with the COE and DOC programs.
- Expose students to successful Native American engineers to discuss barriers in education, social and professional environments.
- Help students discover and evaluate career options and choices, and develop a network of professional opportunities

The one-credit course is offered for Native American students both semesters of the academic year. Freshmen, sophomores, and new transfer students are required to enroll in the course. Upper-division students (juniors and seniors) are not required to enroll in the seminar. Instead, these students spend time mentoring new students; presenting material for the course; inviting role models, faculty, or employers they wish to hear from; and spending time in the student study center. Topics for the seminar vary each semester. Fall semester features extension of topics introduced in the Bridge program including successful student skills, presentations by upper-division students on engineering degree programs, mentoring activities, discussions from professional student organizations on campus, and faculty talks on research in engineering. Spring semester features speakers invited by upper-division students, employers with opportunities for internships, simple engineering design projects, resume and interview development by career services, and field trips to local engineering companies and manufacturing centers. The seminar features two or three Native American professional engineering role models as speakers each semester of the academic year.

The DOC seminar offered for the first time in spring of 2004 produced some positive results relating to several program objectives. Students reported that the seminar made them more aware of the COE community, faculty, and administration; they also reported that the seminar was successful in exposing them to Native American engineering professionals. In addition, students noted that they knew more, as a result of the seminar, about internship possibilities. Some students reported learning more about career options, including graduate school. The seminar also indirectly contributed to progress toward the objective of "Enhancing the sense of community for Native American students in the College of Engineering." Another positive result for the seminar is that many different topics were mentioned as Most Favorite Topic, which indicates that the selection of topics is meeting the varied needs and interests of students.

Conclusion

In this paper we have focused our discussion on the activities of our Native American retention program including (1) the Summer Bridge Program for new engineering students; (2) the student contract, including responsibilities of the students; (3) support in the form of tutoring and mentoring; (4) financial support; and (5) the DOC Seminar, which is the vehicle for establishing the "Learning Community." We have presented some initial program evaluation, which provides evidence that we are moving in the right

direction with our retention activities. We continue to assess these program activities and adjust to best fit our program goals and objectives. We are hopeful that we can report in years to come that our Native American students are completing engineering, engineering technology, and computer science degrees.

Bibliography

[1] The DOC program contract was adapted from a contract used by the American Indian Student Services, Division of Student & Outreach Services, University of North Dakota, Grand Forks, ND, www.und.edu/dept/aiss.

[2] Pavel, D.M, Skinner, R.R., Farris, E., Cahalan M., Tippeconnic, J., Stein, W. (Jan 2005) American Indians and Alaska Natives in Postsecondary Education. *Education Statistics Quarterly*, Vol 1; Issue 1; Topic: Postsecondary Education. http://nces.ed.gov/programs/quarterly/vol_1/1_1/

Biography

Heidi M. Sherick, M.Ed., is Assistant Dean for Undergraduate Programs and Diversity in the College of Engineering at Montana State University. She is in charge of efforts to increase diversity in the College of Engineering by recruiting, advising and supporting minorities. She is the Director of EMPower and the Project Director of the DOC program. She has over 5 years of experience in teaching middle school science.

Sheree J. Watson, M.S., is Assistant Project Director for the DOC Program in the College of Engineering at Montana State University. Sheree has over 5 years of experience in teaching and mentoring Native American students and over 5 years experience in 7-12 grade science education. As assistant director she has primary responsibility for the implementation of DOC program components.

Carolyn Plumb, PhD, is the Director of Strategic Projects for the College of Engineering at Montana State University. Her work revolves around instructional development, curriculum reform and enhancement, and assessment of student learning. Prior to August of 2004, Plumb was at the University of Washington, where she directed the College of Engineering's Communication Program and also served as an instructional development and assessment specialist for the School of Law.