Work in Progress – Service Learning in the Engineering Curriculum

Norma Boersma¹, Leonard J. Bohmann ²

Abstract – A new project-based service learning program was created at Michigan Tech during the Spring 2005 semester. The program uses the same structure as Michigan Tech’s Enterprise program which gives students the opportunity to work on multi-disciplinary, student-led teams solving industry-supplied engineering projects. The Service and Leadership Enterprise (SLE) shifts the focus from an entrepreneurial enterprise to that of a non-profit organization solving humanitarian problems. Although each of Michigan Tech’s Enterprise teams is intended to be multi-disciplinary, most attract one primary engineering discipline. This new Enterprise has attracted students from the sciences and business, as well as multiple engineering disciplines and will provide a very diverse setting for engineering design. During the first semester the students defined their own vision for the enterprise and visited the community they would be working with in their inaugural project. SLE’s initial project will be partnering with a church on the Oglala Sioux reservation to build a community center.

Index Terms – cultural awareness, engineering design, diversity, service learning, teaming

INTRODUCTION

For many college students, the time spent in college is a period of high idealism. By having educational programs tap into this idealism, students become more excited and engaged in their education. In recognition of this, Michigan Tech is creating a path through the engineering curriculum that thoroughly embraces service learning by establishing a Service and Leadership Enterprise in the Spring of 2005.

MICHIGAN TECH’S ENTERPRISE PROGRAM

The Service and Leadership Enterprise (SLE) will use the same structure as Michigan Tech's Enterprise program, an entrepreneurial program established in 2000 where students work on multi-disciplinary, student-led teams to solve engineering problems supplied by industry partners. Faculty members serve as mentors while students develop the organizational structure for their enterprise team, budgets, and project timelines as they solve industry-sponsored projects. Students may join an Enterprise team in their sophomore year and thus become active in real-world engineering design in a business-like setting early in their academic careers. Students can earn either a minor or a concentration in Enterprise, and for most students, the Enterprise path fulfills capstone design requirements. Since its inception, over 20 Enterprise teams focusing on the automotive and recreational vehicle industry, robotics, innovative castings, alternative fuels and others have formed. [1-2] SLE is the only Enterprise to shift the focus from an entrepreneurial enterprise to that of a non-profit development organization which solves humanitarian problems.

ENROLLMENT IN SLE

Four students enrolled in SLE in its inaugural semester and three students from a previously existing enterprise joined SLE. Although each of Michigan Tech’s Enterprise teams is intended to be multi-disciplinary, most attract one primary engineering discipline. The diversity of major in SLE far exceeds that of any other Enterprise team. Spring membership in SLE included psychology, business, forestry, construction management, and civil and biomedical engineering students. In addition to these majors, math and biology majors have enrolled for the Fall, 2005 semester. This variety in major will provide a very diverse setting for engineering design. However, at this initial stage it appears that non-engineering majors are more attracted to the service concept than engineering students. While the ratio of females to males at Michigan Tech is 1:5, the ratio of females to males in SLE for the spring semester was 6:1.

SLE’S VISION AND MISSION

SLE’s sponsor founded the enterprise based on a vision to train a new generation of student leaders prepared to find appropriate solutions to basic human needs in diverse cultural settings. Because an Enterprise is student-run, the students were charged with creating their own mission and vision which are as follows:

MISSION - “Creating sustainable solutions with communities in need.”
VISION - “We are a team of multi-disciplinary leaders that have come together to serve communities in need. The Service and Leadership Enterprise recognizes the diverse populations in local and world communities and strives to learn from them. We are an organization composed of skilled and talented students who will apply our knowledge for the betterment of our world communities.”

¹ Norma Boersma, Lecturer, Engineering Fundamentals, Michigan Tech University, norma@mtu.edu
² Leonard J. Bohmann, Associate Professor, Electrical & Computer Engineering, Michigan Tech University, ljbohman@mtu.edu
Underlying these statements are the ideas that in any project the Enterprise undertakes, students will strive to understand the culture they are working with and will consider cultural impacts of their designs. They will chose solutions which communities can continue to implement themselves after the Enterprise is no longer working with them. They will also work as partners with communities, rather than as outside “experts”.

INITIAL PROJECT

Six students from SLE traveled to the Pine Ridge Reservation in South Dakota over Spring Break, 2005, in order to define a design project they could work on. In preparation for the trip, students met with members of the Keweenaw Bay Indian Community whose tribal headquarters are located about 25 miles from Michigan Tech. These members explained some of the Native American customs, beliefs, and means of personal interactions. The students read Black Elk Speaks and several magazine and internet articles about the Ogala Lakota to gain an understanding of the history and culture of Pine Ridge. They researched census data to better understand the economic climate on the reservation.

Once at Pine Ridge, the students met with tribal leaders and members to learn about the needs and culture on the reservation. They met with a representative of Partnership Housing, an organization similar to Habitat for Humanity, to discuss housing needs on the reservation. SLE met with the local public radio station, KILL, and discussed an ongoing wind turbine project at the station. They met with a church council interested in building a community center. Members of the community, including tribal council members, met with the students simply to talk about the culture, history, and way of life on the reservation. The SLE team visited Harney Peak, the site of Black Elks vision, as well as Wounded Knee, the site of the 1890 massacre and the 1973 occupation by the American Indian Movement (AIM).

To incorporate service into the trip as well as to enhance SLE’s relationship with the community, SLE members painted rooms in a dormitory of a residential high school and interacted with children at a drop-in center. For some SLE members, this time spent with the Pine Ridge children was the most memorable part of the trip. They saw how much the children enjoyed interacting with them and how important it was for the children to be able to go to the drop-in center as they did not have a stable home to go to. From the interactions with the tribal members and children, SLE students saw first-hand what life is like in the second-poorest county in the nation. SLE students came away from the trip emotionally-drained and determined to make what contributions they could to this community.

Upon their return to Michigan Tech, SLE’s task was to sort through all the potential projects they uncovered on their trip. Through this process, the students decided working with Partnership Housing and the church wanting to build a community center were the most viable projects for the Enterprise. The students chose projects with Partnership Housing based on the dire housing situation on the reservation. Partnership Housing charged the students to design a single-family dwelling with material costs less than $25,000 and to find a way to construct basements or storm shelters substantially below present costs. The goal of the students is to incorporate as much green housing as possible in the housing design. The students were attracted to the idea of designing a community center that would reflect the Native American culture (i.e. a building that is not square, rectangular, or traditionally American). It is quite likely the church would be able to raise the necessary funds to build the center, and the students could return to the reservation to participate in the construction process. Also, because most of the communities on the reservation are in need of a community center, the students’ innovative design could serve as a prototype for other communities.

CHALLENGES FOR FALL, 2005

Despite a major campaign to recruit students for the fall semester, SLE’s enrollment is anticipated to be eight students in Fall, 2005. Of these eight students, only two are in engineering and one is in engineering technology. Recruitment campaigns in the spring focused on recruiting students to design low-cost green housing and basements and a community center, however, the two new students that enrolled in the Enterprise were not engineering students. A major challenge of SLE will be to find a way to attract more engineering students into the Enterprise. Although another major recruiting effort will take place at the beginning of the fall semester, SLE has already had to tell Partnership Housing that we cannot commit to a project with them at this time.

Another challenge SLE faces is in utilizing and fully engaging the wide variety of majors in the Enterprise. While engineering students are needed and willing to complete the design projects, the biology, math, and psychology students currently enrolled are more interested in providing input rather than focusing on design. The challenge will be to keep these students actively involved throughout the semester and in aspects that are more directly related to their major.

ACKNOWLEDGMENT

Thrivent Financial for Lutherans through Lutheran Campus Movement at Michigan Tech as well as the Parent’s Fund of the Michigan Tech Fund are thanked for their support.

REFERENCES
