

Engineering Community Participation in the Development of a Civil Engineering Program

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Abstract

In response to the current ABET accreditation criteria almost all engineering programs have established an industrial advisory board to provide feed back on efforts to meet the program educational objectives. The Civil Engineering program at Minnesota State University, Mankato assembled an Industrial Advisory Board (IAB) shortly after the program was established in the fall of 2000. The Civil Engineering IAB has since been working extremely close with the Dean's office and the Department as the Civil Engineering program develops. The Board engaged in activities that are well beyond the review of program educational objectives. This paper presents our experience of working together, between academia and the engineering community, to build a new civil engineering program. The participation of the engineering community in the Civil Engineering program has enriched the program and the students' career opportunities and has demonstrated that the community and the university can work together in an effort that benefits all.

Introduction

The Civil Engineering program at Minnesota State University, Mankato (MSU) is about three years old and has completed its initial ABET accreditation visit in the fall of 2003. The program was initiated in response to the engineering community's need for civil engineering graduates. The survey of civil engineering firms, municipalities, and the Minnesota Department of Transportation (MnDOT) provided evidence of this need in greater Minnesota.

The Civil Engineering Industrial Advisory Board (IAB) was assembled in the spring of 2001 to provide advice and support to the development of this program. In this paper, the composition of the IAB is briefly introduced, followed by a summary of activities and future plans for which the Board has been engaged.

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The Civil Engineering Industrial Advisory Board

Members of the Civil Engineering Industrial Advisory Board (IAB) at Minnesota State University, Mankato represent diverse sectors of the profession. Table 1 shows the composition of the Board by business type of the membership affiliations. The membership includes presidents, CEO, vice presidents, and office or division managers in the private sector. In the public sector, there are city and county engineers, a deputy director of public works, and a district engineer of the Minnesota Department of Transportation.

Table 1. Composition of MSU Civil Engineering Industrial Advisory Board

Business type of IAB member affiliation	Number of members
Consulting firms	6
City/county/state	4
Civil engineering product suppliers	1
Construction	1
Others	3

Mission and Vision Statements

The IAB convened for the first time in June 2001. One of the Board's first actions was to draft the following *Advisory Board Mission Statement* which was subsequently passed: "*The Mission of the Civil Engineering Advisory Board at Minnesota State University, Mankato, is to provide consultation on trends and needs in civil engineering, to support causes that lead to excellence in civil engineering education, and to monitor the success of the civil engineering program.*" In order for the Board to meet its mission, the following attributes were identified:

- To provide "applied engineering" experience to the staff
- To provide learning experience for the students
- Review curriculum on annual basis
- Review "balance" of staff background/education as program grows
- Provide "seed" money to get program off the ground
- Lobby legislators to secure needed funding

During the same meeting, the Board also discussed the vision statement of the program. A subcommittee was created to draft the statement which was adopted in the October 2001 Board meeting. The vision statement states that, "*MSU Civil Engineering – Focusing on being a Leader in Applied and Innovative Civil Engineering Education*".

Board Activities

The Board formally meets twice a year with dates that coincide with the College's advisory board meeting for all engineering and technology programs. Since the Board's inaugural meeting in June 2001, they have held two special meetings in addition to the regularly scheduled meetings. In January 2002, the Board met to discuss the curriculum including the review of courses, both required and electives, in each civil engineering proficiency area. More recently, the Board met to develop a 5-10 year strategic plan to assist the program to meet its long term goals in graduates and quality education.

The Board was fully engaged in the ABET accreditation process. They reviewed the self-study report and met with the ABET visiting team during its site visit. The ABET team was impressed with the level of participation from the engineering community. In the following sections, specific contributions and involvement by the IAB and the engineering community are described in greater detail.

Financial Support and Scholarships

In the past three years, the private sector membership of the Board has contributed over \$150,000 to the program to support staff salary and other expenses. To hire civil engineering faculty in a timely manner, the Board was instrumental in raising fund to assist the University by paying the first year's salary for two of the faculty members, a contributive process which allowed for rapid programmatic startup.

A scholarship was initiated in 2003 by the chair of IAB to support the students. Moreover, many of the Board members are actively serve on the board of directors or on executive committee of various professional organizations. Through their effort, the program has received almost \$20,000 from these organizations. In additions, these organizations also provide scholarships to our students. Table 2 summarizes the number of scholarships received from professional organizations since 2001. The contribution of the Advisory Board members on these scholarships cannot be overlooked as some of them serve on the scholarship selection committees of these organizations. Moreover, almost all of these scholarships were awarded only to students of ABET accredited programs. The Board members were successful in conveying the quality of our program and students to the professional community which allowed our students to compete for the scholarships.

Table 2. Summary of scholarships through the efforts of IAB members received by MSU civil engineering students in each academic year.

Scholarship	2002-03	2003-04	2004-05
American Engineering Consulting Companies, MN section	1		1
City Engineers Association of Minnesota	2	1	3
Minnesota County Engineers Association		1	1
Minnesota Public Works Association		1	
Minnesota Surveyors & Engineers Society		2	3
Martin C. Menk, Jr. Scholarship			1

Employment

The civil engineering program at MSU has graduated two classes with a total of nine students. All of the graduates passed the Fundamentals of Engineering exam. Among all the graduates, six joined companies in Mankato area and all except one work for companies with presence in the IAB. The company that the sixth student works for has presence in the University's Foundation Board. Two graduates work near their hometowns in the out-state area. One graduate works outside Minnesota. Through the network of the IAB members, all the upper-division students who wish to gain summer intern experience have all found summer employment each year. The classes of 2005 and 2006 are expected to have 10 to 11 students each. The smaller class sizes result from the inability to advertise widely because the official ABET accreditation status will not be known until late August 2004.

Guest Speakers and Technical Consultants

Members of the advisory board or their associates have frequently guest lectured in our classes and more noticeably in the lower-division introductory and seminar classes. Each year, we had 10-15 guest speakers in the seminar class. When the request is sent out in early summer for the fall term course, the schedule was usually filled within two to three weeks. The engineers have always been very gracious in coming to campus to speak and meet with the students.

The seniors consulted heavily with engineers from both public and private sectors for their capstone design projects. In the 2003 project, they sought the expertise of 15 engineers and other professionals. In the 2004 project, they sought the expertise of 12 individuals.

When the program was at its earlier stage, due to budget constraints and other factors, we were in need of faculty to teach the geotechnical engineering and hydraulics and hydrology courses. Two board members and an engineer from a local engineering firm stepped to the plate and taught the courses for us. For those in academia, it is well known how much preparation is required to teach a course for the first time. Furthermore, most faculty members would have an

additional advantage in that the course development effort would be averaged over time as additional opportunities are available to teach the course again. These engineers agreed to teach the courses for us recognizing that they would not be teaching the same courses in the near future as new faculty were added to the program. Their sole motivation for agreeing to help the program was their desire to see the program succeed.

Equipment and Facilities

Like many programs, there is always a need for state-of-the-art laboratory equipment and space. Being a new program, the need is even greater. Through communication with engineers from the MnDOT in our district and other municipalities, we have received some soil testing, concrete material testing, and surveying equipment. We also received concrete aggregates from concrete product producers in the region.

Our students were also given the opportunity to use discipline specific software at various engineering firms' offices when the needs arise. Currently, the program also has an agreement with MnDOT District 7 to use their material testing lab facility and their staff to teach our students two lab sessions on superpave and hot mix asphalt pavement.

The use of MnDOT facility alleviates part of the short term facility, equipment, and space deficiency. For a long range plan, the program needs offices, lab, classrooms, and student activity/project space. A new addition to the current Science, Engineering and Technology building for the science programs would open up space for the civil engineering program. The IAB has been very active in lobbying legislators to support the funding of the building expansion.

Future Plans

To help the program continue to develop and meet its goals in quality education, the IAB held a special strategic planning session in June 2004. The board identified attributes, from recruitment to finance, that would help meet the program goals. Subcommittees were formed to recommend appropriate actions for each attribute.

CONCLUSIONS

This paper presents the activities of the Civil Engineering Industrial Advisory Board at Minnesota State University, Mankato (MSU), the engineering community's interaction with the students, and it demonstrates how collaboration with the engineering community has enriched the program and the students' learning experience and career opportunities.

The close relationship between the engineering community and the Civil Engineering program yields mutual benefits. The support from the engineering community has helped the program

develop as evidenced by the program's ability to seek ABET accreditation after three short years. The engineering community benefited from its involvement in the program as the majority of the graduates work for firms around Mankato as well as their hometowns in out-state Minnesota. Furthermore, the input from the engineering community has helped the program develop a curriculum that allows its graduates to fit into a company easily and to develop a successful career. For example, the senior capstone design project at MSU is executed with the goal of emulating a typical engineering office (Chou and Wilde, 2003; Chou et al., 2003). This concept was developed based on many discussions the faculty have had with the engineers and IAB.

Another important benefit of the industry-academia relationship is that it offers a better understanding of each other's role in these two different and changing environments. Many of the engineers were educated under a very different climate and in a different time with perhaps 150 credit hours for their degree. Through our discussions, our Board members understand the constraint that the university has to operate within and the decision the faculty has to make between breadth and depth under shrinking credit hours curriculum. Furthermore, it is especially important for the engineering community to be involved in the engineering education with the current ABET criteria where each program can set its own educational objectives. A graduate's preparation can vary significantly among programs. This is contrary to the past where all graduates of an ABET accredited programs would have similar training.

For this partnership to be successful, it is important for each party to recognize its role and to respect the other's role. The academia must be open minded, progressive, and listen to the constituents' needs. The engineering business has changed in the last few decades. Our engineering programs have to evolve in order for our graduates to be successful. On the other hand, the engineering community has to recognize that the university is preparing students for a spectrum of engineering careers and therefore must enforce some very fundamental engineering principles. When each party recognizes its role and respect the other's, the industry-academia collaboration will be able to strive to achieve a common goal of preparing our next generations of quality engineers.

References

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