The Power of University - Industry Collaboration: A Model Partnership

Sofia M. Vidalis, Ph.D.
Pennsylvania State University at Harrisburg
Dr. Sofia M. Vidalis
Assistant Professor of Civil Engineering
Penn State at Harrisburg, The Capital College
Civil Engineering and Engineering Technology
777 West Harrisburg Pike, W-236
Middletown, PA17057
Office: (717) 948-6122
Fax: (717) 948-6502
svidalis@psu.edu

The Power of University - Industry Collaboration: A Model Partnership

Sofia M. Vidalis, Ph.D.
Pennsylvania State University at Harrisburg

ABSTRACT

The goal of any university curriculum is to provide the information and skills so each student can be successful in a chosen career. This is especially critical for the Civil Engineering and the Structural Design and Construction Engineering Technology programs at Penn State Harrisburg. These programs are continuously planning, developing, and modifying their curriculum to keep abreast of the changes and advancements that are made in the engineering profession. The industrial relationships and partnerships that a program develops are critical elements to its success. Programs that foster and strengthen relationships with firms and professional associations will not only benefit the university but also those firms and associations.

This paper will discuss and model how Penn State Harrisburg's Civil Engineering and Structural Design & Construction Engineering Technology programs have been collaborating with the industry through its advisory board, financial support, student organizations, campus events, professional events, field trips, and outreach programs. These various activities have been an excellent example of a win-win relationship between the university and its partners.

INTRODUCTION

Partnership between an Educational Institution and Industry is not a new concept in fostering learning among students. There are many universities that work closely with business and industry partners to develop programs to fit their needs. Universities and industries traditionally maintained collaborations by including student internships, faculty exchanges, and industry design projects to complete a degree program. The purpose of these partnerships is to meet the needs of industries, governments, national laboratories, and the training needs of the university students.

The goal of any university engineering curriculum is to provide the information and skills so each student can be successful in a chosen career. This is especially critical for a civil engineering and engineering technology program. The program is continuously planning, developing, and modifying its curriculum to keep abreast of the changes and advancements being made in the design and construction engineering profession. The industrial relationships and partnerships that a program develops are critical elements to its success. Programs that foster and strengthen relationships with engineering firms and professional associations will not only benefit the program but also the engineering firms and associations.

The purpose of this paper is to discuss the connections between Penn State Harrisburg's Civil Engineering (CE) and Structural Design & Construction Engineering Technology (SDCET) program and the engineering industry. This paper will also discuss the various activities and programs for partnership that are conducted from the advisory board, student organizations,

national construction associations, financial support, and outreach. These various activities and programs have revealed excellent examples of a win-win relationship, which benefits both the university program and its partners.

ADVISORY BOARD

The program at Penn State Harrisburg has two advisory boards: SDCET and CE. Both advisory boards are unique in that its membership is a representative in various aspects of the design and construction engineering industry. The SDCET by laws requires the 21 membership to consist of SDCET graduates, small and large construction firms in addition to engineering companies which may have national and/or regional recognition in various aspects of the construction industry. The board also includes a representative from Pennsylvania Department of Transportation (Penn DOT), Associate General Contractors of America (AGC), Associated Builders and Contractors (ABC), a lawyer in construction law, an architect, and even a high school counselor. The CE program is a fairly new program at Penn State Harrisburg and therefore consists of fewer members. It currently has six active members on the board. The CE board includes a technical manager in transportation and water resources, a project manager, a bridge and tunnel maintenance coordinator, a President and two Vice Presidents of different civil engineering firms. Similar to the SDCET advisory board, the CE advisory board has similar by laws, consists of CE graduates, and small and large civil engineering firms. Both of the advisory boards present private, public, and government sections.

The membership composition provides valuable resources to legal and state licensure, exposure and interaction to secondary schools, interfacing with various audiences and employers of the design and construction engineering industry, and an advocate to each program. Both advisory boards act in advisory capacity to the CE and SDCET programs, the School of Science, Engineering and Technology, and the college. One of their goals is to identify the needs and trends regarding employment for the graduates. The board offers recommendations for improvement to the curriculum offerings and serves as an avenue of communication between each program and the design and construction engineering industry. The board assists in preparation of surveys and reports as required for their accreditation as well as other information for each program. Each advisory board promotes financial support to each program and student organization. The SDCET Advisory Board supports the Penn State Professional Engineers & Contractors (PSPEC) and the CE Advisory Board supports the Civil Engineering student club. They both support each student club in field trips to construction sites, networking events, hiring, and career and professional advice. In addition, have the opportunity to also be a guest speaker in engineering and engineering technology courses.

Both Advisory boards have been identified by the college to be an excellent example for industry and university collaboration[1]. Their activities show how different an industry and a civil engineering and engineering technology program both benefit. The advisory board activities include: design and construction engineering awareness luncheon for high school counselors, review of course syllabi, informal gatherings, student forums, networking events, and resource to the program and faculty.

Both advisory boards collaborate in many events. They host a luncheon that is held at Penn State Harrisburg to inform high school counselors about the design and construction engineering industry: its economics, workforce, and job opportunities. During this luncheon, both advisory boards present and provides information on both CE and SDCET programs and why they feel it is excellent for high school students interested in the design and construction engineering profession. The CE and SDCET Career Fair is held right after the luncheon to which the counselors are also invited to attend to learn more about the industry from the various firms in attendance. The firms that attend the career fair provide displays and information about their companies. Most importantly, students have the opportunity to talk with the recruiters from many design and construction engineering firms and also have informal interviews about full-time, part-time, and internship/co-op positions. This event is always successful and numerous contacts are always made, which benefits both the firms and the students. It is also an excellent occasion to inform a key person to students on their career path about the design and construction engineering industry. The counselors have provided an opportunity for both programs to participate in numerous high school events, which are limited to other professions. This annual event has provided a great opportunity for counselors, firms, faculty, and students to network together.

The advisory boards annually review several course syllabi to ensure the material is current to the industry as well as provide advice to the instructors on course structure. A group of board members with the expertise in a particular subject in design and construction engineering reviews the material with the instructors of the courses. The advisory boards may also include key employees within their organization to assist in the review process. The constant interaction between academia and the industry is an essential requirement to train and develop students to have the knowledge of what is expected in the real world. The advisory boards' suggestions are valuable and therefore are incorporated in both civil engineering and engineering technology courses. The instructors also continue their relationships with the advisory boards' in consulting, research, or other activities to provide a win-win partnership.

FINANCIAL SUPPORT

The first college endowment was created for the SDCET program to provide scholarships to students in the major. Additional endowments have been created for both CE and SDCET programs in order to support faculty, research, outreach programs, student development, and more student scholarships. Various construction and engineering firms as well as alumni have generated funds to support these endowments for both programs. The local construction and engineering associations have also created their own undergraduate scholarships with one criterion being that the student must be majoring in either the civil engineering or engineering technology program. This demonstrates their commitment and their partnership to Penn State Harrisburg.

STUDENT ORGANIZATION PARTNERSHIPS

Penn State Professional Engineers and Contractors

Penn State Professional Engineers and Contractors (PSPEC) is an umbrella organization of three national associations: Associated General Contractors, Associated Builders and Contractors and the National Society of Professional Engineers. The club's activities and commitment to the program is a key component to the student's education, for professional growth, and also to keep them current with the construction industry. Members of PSPEC also produce a resume book annually, which is sent to more than 150 firms. This book contains resumes of students in the SDCET program and it is separated into three sections. The first section provides information and a brief overview about the SDCET program, the typical course of study the students take, and the course description. The second section contains resumes from graduating seniors, for full-time positions. The last section contains resumes of students who are seeking summer employment or part-time positions. PSPEC gets involved with various activities with the industry. The various activities include: inviting guest speakers, arrange construction project visits, and local sponsoring chapters activities [2].

Inviting guest speakers to make a presentation, as stated earlier, help the students learn different aspects of the construction industry. The speakers bring valuable educational opportunities to the students about topics by owners, managers, clients and even alumni graduates from Penn State University programs that are involved in that profession. PSPEC also arranges construction project visits with firms. In some cases, the projects are restricted to the outside arena but student organization obtains access to these sites. The firm realizes the importance of assisting the students in their education. PSPEC conducts an annual two-day field trip to Pittsburgh, Pennsylvania towards the end of October, which includes visiting several projects and attending a dinner with the highway and building contractors [3]. In addition, another one-day field trip to Baltimore, Maryland is made in the spring. These trips include high-rise buildings, bridges, institutional, or transportation projects, concrete batch plants, engineer/contractor offices, and testing laboratories. The members are provided first-hand knowledge of how the process is done which helps them relate to things discussed in the classroom. Most project sites allow the students to actually be there next to the workers performing the work. Being in a tunnel that is being dug, going down into a caisson in the middle of a river, seeing concrete poured at 1,200 feet above the ground, or driving a highway that you had walked on during a field trip are experiences these students will always remember.

In addition, PSPEC also has a number of members that attend "CONEXPO" which is held every four years in Las Vegas, Nevada. Students that attend the world construction exposition get to see new construction equipment and technology, exhibits, education sessions, certification programs, and conferences. They also have the opportunity to network with industry professionals at the CONEXPO [4]. The event is also held in conjunction with the national AGC conference at the same site so the students participate in both events.

PSPEC sponsoring chapters have the members involved in their activities. Several students are invited to attend the monthly meeting so they can interact with the members. The chapter allows students to attend seminars that are of interest. Most chapters have an education committee that

serves as the liaison to the student chapter. This committee conducts fundraising activities that support the student chapter and/or the program. Depending on the local chapter, these funds are given to the program, available to the student chapter for their activities, or used to help defer the cost of attending the national conferences.

The "Network Night" event is an informal gathering for Penn State alumni, students, and the advisory board of SDCET [1]. The relaxed atmosphere with light refreshments makes the current students comfortable as they meet graduates; learn about the jobs, and network. During this event, students are able to gain valuable information to contribute in professional growth. The advisory board was recognized and won a university award for this event. A Student Forum is done annually by the advisory board. This allows SDCET students to have the opportunity to network with the advisory board members and ask questions about the program.

Civil Engineering Student Club

The Civil Engineering Student Club started the fall of 2010. It would not have been feasible without the support of the local ASCE Harrisburg Parent Chapter and industry. It is currently under review by the American Society of Civil Engineers (ASCE) to become an ASCE student chapter at Penn State Harrisburg. Although the student club is fairly new, it has been very active with networking events and conferences with the help of the local parent chapter. In the past year, the student club has been actively involved in numerous events. The two major events that have increased the industry and student collaboration were the ASCE dinner meetings and the mock interview event.

The local ASCE dinner meeting events are scheduled once a month during the academic semesters, six times a year. These dinner events consist of bringing the industry and students together. The event always begins with a social hour for the students and industry to network, then a formal dinner, and a presentation on a civil engineering topic. It is a great event for students to network with the local civil engineering industry and also get exposed to information in the field of civil engineering from invited guest speakers. It also benefits the industry because each ASCE dinner meeting counts for one professional development hour.

The most successful event that the CE student club held was the mock interview and panel discussion. The Civil Engineering program at Penn State Harrisburg held a Mock Interview and Panel Discussion event to help students better prepare for an interview as realistic as possible. This was accomplished by inviting professionals from the industry from the construction management and engineering design fields to interview the students. The program used a structured approach in the mock-interviews with the interviewers rating each student from a scale they had created based on their poise/self-confidence, communication skills, experience, and closing, see Table 1. Similar to speed dating techniques, each student had a 20-minute interview with each professional and then was critiqued on their performance. During the mock interview process, each professional was given his/her own table to conduct the interview. The interviews were set up similar to that of a speed dating process. Speed dating is a process whose purpose is to encourage people to meet a large number of new people. This process allowed students and professionals to conduct more interviews. Since the students knew the firms that each professional was representing in advance and from the networking during the social hour,

the students could identify specific professionals from their fields for their 20 minute interviews. A timer was used during the event so that each person knew when to start and end on time. Then each student would then go to the next interview table and go through another 20-minute interview with the next professional. Since the event was only two hours long, each student had a chance to go through the interview process with three different professionals. At the end of each interview, the professionals were given about five minutes to go over each student's strengths and weaknesses. The event closed with the professionals making some comments and then opened up for any questions. Even though this event was to prepare students for a formal interview, several professionals made offers for internships and full-time job opportunities with their companies. After the event took place, an e-mail was sent out to the professionals thanking them for their participation with a questionnaire for their feedback. In addition, thank you cards were also sent out to all the participating firms for helping to make this a successful event. All of the industry professionals mentioned that their experience with the students was very positive. The students mentioned that the Mock Interview Event was a great way to become more comfortable in an interview setting. The students also received a lot of good feedback and criticism on their resume and overall interview. The industry professionals also mentioned that the students looked very eager to be there, which made the event even more successful. Overall, the experience between the students and the industry professionals was a very positive and rewarding experience.

NATIONAL ASSOCIATIONS

Associations like American Society of Civil Engineers (ASCE), Associated General Contractors of America (AGC), Associated Builders and Contractors (ABC), United States Green Building Council (USGBC), and Pennsylvania Society for Professional Engineers (PSPEC) understands the importance of higher education and their relationships to programs like SDCET. They provide a variety of educational and research programs that support construction education and the student who are entering their profession. These associations offer numerous types of scholarships, awards, recognitions, up-to-date information, training opportunities, and conferences. The following shows some of what the associations offer:

- The associations offer undergraduate scholarships to students in accredited construction and civil engineering programs. The successful recipients receive the scholarship annually while completing their degree. This makes a difference in their education. The foundations also provide a limited number of graduate scholarships. Both CE and SDCET programs have been successful with numerous students receiving the undergraduate scholarships in the past.

- Several constructor associations recognize a university instructor who prepares these students for the construction industry. This award that is given at their national meeting, allows the association to acknowledge the accomplishments of faculty who have contributed to their programs and the construction industry. A SDCET faculty member has received this prestige award in the past.

- The associations recognize the value of faculty participating on their committees. The faculty is a key player to the constructors in developing educational initiatives and supporting

students. This is an excellent chance for the construction industry to interact with faculty towards educating the future constructors. Faculty members in both the CE and SDCET programs have been appointed to numerous of these national association committees as well.

- The AGC's Education and Research Foundation board comprises of past national AGC presidents and two educators. They oversee the selection of the undergraduate and graduate scholarships recipients as well as awarding university research projects. The foundation identifies the research and solicits universities to seek funding. The SDCET chairman recently completed his second three-year term on the foundation board. Again, this relationship has provided a win-win partnership.

- One association allows student access to their web site, which provides up-to-date information on legislative issues, training opportunities, safety standards, and copies of standard documents that are used in most of the construction projects in the United States. It is a good resource and research tool that students can use.

- Most of these associations allow the students to attend their national conference for a nominal fee. The students have the same opportunities as the association members in attending presentations, visit exhibit areas, and network events. This has proven to provide internships, jobs, discounts to software and products and partnerships with the program.

OUTREACH PROGRAMS

Another key partnership with the design and construction engineering profession is the CE and SDCET outreach. The activities have fostered into a rewarding experience for both the firms and the SDCET program. Some of these activities include: research, part time job opportunities, continuation of education, workshops, and many other opportunities of keeping current with the industry.

- The construction industry has provided frequent opportunities for the program's faculty. Faculty has consulted with firms to specific initiatives or research projects. Some of these partnerships have developed into a funded research project for the faculty member. This partnership has supported the knowledge to firms and the program.

- The firms have hired faculty during the summer. This allows the faculty member to keep current in the industry, which is essential in the constantly moving industry. The faculty member takes this experience back to the classroom so the curriculum is integrating this material. The firm's also benefits from the faculty members expertise and skills, which becomes a valuable resource. The firm continues the partnership with the faculty member during the academic year. This partnership provides firms an opportunity to become more involved with the program, its students, and their future employees.

- The program offers outreach programs to the construction community, which has benefited in this partnership. A firm has contracted on site training from the college on specific topic, which the faculty is the instructor. The program offers workshops, presentations, and continuing education courses that give opportunity for various firms to

obtain the information. These professions may be required to obtain training or continue their learning in approved Continuing Education Unit (CEU) programs. The university's resources have provided an excellent environment to deliver the program at one location, state wide, and by the Internet superhighway across the world. The two programs continues to partner with the construction industry and contribute its future.

CONCLUSIONS

The various activities and organizations from the advisory board, financial support, student organization partnerships, national associations, and outreach programs demonstrate the partnerships universities can have with the construction industry. This partnership is a win-win relationship because at the end, they both help each other. They also both realize the need to work together for the betterment of the students and the construction industry's future. These students will be the future leaders, and both parties have a responsibility to educate the students about their profession. The various activities and rewards are only limited to the amount of commitment the construction program places on these relationships. The programs that foster and strengthen relationships with design and construction engineering firms and professional associations will not only benefit the program but also those firms and associations. The more the students get exposed to the various activities and organizations that the school provides, the better prepared the student will be to face the challenges of the real world.

REFERENCES

1. "Corporate," Penn State Alumni Magazine, Fall 2006.
2. Science and Engineering Technology (SET) News (Fall 2003), www.cl.psu.edu/set/docs/set_newsletter_fall2003.pdf, Accessed 1/12008.
3. "Executive Summary," Construction Association of Western PA. Newsletter, November 2007
4. CONEXPO (2008). http://www.conexpoconagg.com/. Accessed 1/10008.

Table 1: Interview Rating Sheet

Name: _____ Interviewer: _____		Below Basic	Basic	Proficient	Advanced	Comments
Preparation	Turn off cell phone/pager. Resume					
Poise/Self-Confidence	Introduces self with firm handshake & friendly greeting. Avoids nervous actions and mannerisms during interview. Reacts appropriately. Sits correctly with good posture. Maintains eye contact. Refers to interviewer by name.					
Communication Skills	Uses correct grammar and avoids slang. Speaks slowly and clearly. Avoids mumbling. Answers questions thoroughly but keeps answers pertinent. Phrases responses in short, simple sentences. Ask appropriate questions.					
Experience & Skills	Does not criticize former employer. Does not discuss personal problems, finances, religion, or politics. Listens closely to any questions and comments. Makes positive statements. Clearly describes value from experiences/skills/related coursework.					
Closing	Thanks employer for interview with firm handshake. Ask preferred communication type for future correspondence.					