AC 2010-407: OVERCOMING THE CURRENT CHALLENGES OF PROMOTING AND ENHANCING INTERNATIONAL OPTIONS WITHIN ENGINEERING EDUCATION

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Overcoming the Current Challenges of Promoting and Enhancing International Options within Engineering Education

As universities endeavor to provide developing engineers with the most comprehensive education possible, we face two great challenges: how do universities create global engineers and how do we accomplish that in the face of shrinking budgets. Many authorities suggest a variety of pathways for students to gain international experiences and global competencies including student exchange programs, faculty-led study abroad trips, dual degree programs, international internships and international research collaborations. While all of these options have clear educational benefits, how do we create more effective programs and disseminate the relevant program information to the students when both human and financial resources are scarce? By using the resources at hand, the College of Engineering at Virginia Tech has found a way to overcome these challenges.

The concept of a well-rounded engineer is continuously developing, becoming more robust and more demanding. Students are expected to take more complex courses, get work experience and participate in a multitude of other clubs and activities to diversify their background. At the same time, engineering programs and universities around the world are challenging students to become more global. Too often, working with international colleagues on campus is the only intercultural experience students get: American science and technology students study abroad at much lower rates than the general student population. About 16% of all study abroad students are in the science, technology, engineering and mathematics (STEM) fields, compared to about 26% of the general undergraduate population[i]. In accordance with ABET accreditation criteria, and to further the consistent and systematic improvement of engineering education, programs must be able to demonstrate that the students can attain the following outcomes:

- the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- a recognition of the need for, and an ability to engage in life-long learning
- a knowledge of contemporary issues[ii]

To achieve these goals, and that of global competency, students can participate in student exchange programs, faculty-led study abroad trips, dual degree programs, international internships and international research collaborations. Creating effective programs while dealing with increasing budget constraints is complicated but can be accomplished through the use of resources already available at the university: alumni, students and faculty.

This paper will discuss the challenges and opportunities presented through the use of alumni, students and faculty in bolstering international programs support. It will also review potential methods for increasing the promotion, effectiveness and reach of the international programs available through engineering programs.

International Programs Alumni Planning Board

The College of Engineering International Programs Office has established an International Programs Alumni Planning Board to leverage these existing expert resources. The Board is composed of College of Engineering alumni who have significant international experience.

Current board members are located in Germany, India and England and other members having recently lived in Italy, Japan and China. The alumni have volunteered to help in areas such as securing international internships and providing mentoring for students interested in working or studying abroad. They have been essential in the planning process as study abroad trips are designed to include industry tours, university visits and cultural events that cater to engineering students. The Board members and their individual companies have also been generous in their attempts to garner financial support such as grants, student scholarships or even sponsored meals while students are abroad. In these difficult economic times, utilizing the support of the alumni is crucial to expanding the reach and role international programs plays in developing a well rounded engineering education.

University alumni can serve as a highly beneficial outside resource to developing and existing international programs. Connecting past and present students will facilitate a dialog serving a number of purposes. Alumni who have international experience, whether studying, working, interning or living abroad, can provide helpful insight into the cultures and customs of countries all over the world. They can also help students make useful corporate connections for potential international internships or job opportunities. This link can even become something more meaningful as mentoring relationships develop out of a common interest in global engineering.

At the college level, alumni can work with study abroad groups to enhance their time spent abroad. Engineering students in particular can derive great benefits from factory visits, company tours or on-site expeditions. Sponsoring or facilitating these activities for students abroad gives the individuals an inside look at how engineering is practiced around the globe. With the alumni's assistance, students are able to see how they, too, can become a part of the global engineering network. Finally, using corporate connections, alumni can bridge the gap between university international programs and potential corporate funding opportunities. Alumni serving as a liaison between the company and the engineering program can ensure that funds are both adequate and properly appropriated.

International Programs Ambassador Club

In addition to alumni, one of the greatest assets any university has is the students themselves. Students returning from a stint abroad tend to be some of the greatest marketers for individual programs and they often don't even realize they are doing it. By posting details of their trip on social networking sites such as Facebook©, Twitter© or YouTube©, students share their personal adventures with their friends, families and social network. This form of viral marketing has the effect of getting others excited about the prospect of traveling abroad whether through the same academic program or another similar arrangement. Corralling this previously unsolicited marketing activity can be of great benefit to international engineering programs. Creating groups or web pages where students can discuss frequently asked questions or compare various exciting opportunities saves the engineering staff time and money and also promotes a community amongst students.

A more formal approach to gaining student assistance can be achieved through student groups such as the student ambassador programs established at Purdue University[iii] and the University of Massachusetts at Amherst[iv]. These universities and many others employ peer counselors to help students navigate the complex study abroad process. A student with previous international

programs experience sharing their views is one of the quickest ways to generate enthusiasm in interested students. For example, the Deutscher Akademischer Austausch Dienst (DAAD), a German academic exchange service, employs returning students that fellow students tend find more approachable and engaging than the typical study abroad promoter. This "Young Ambassadors" group gives interested students the opportunity to "Find someone who studied where you want to go, who specializes in your field, or who comes from your home state or college—and ask them whatever you ever wanted to know about study or research in Germany!"[v]

Additionally, organizing panel discussions, five to ten minute classroom presentations or information sessions where the students are the featured speakers will effectively put students at ease asking questions and gathering information about international opportunities. The common misconception that engineering curriculums leave little time for international opportunities will be dispelled as students hear firsthand that it is feasible.

The International Programs Ambassador Club is composed of students who have studied or worked abroad and are excited to share their stories. The Ambassador Club is designed to increase interest in the College of Engineering's signature program, the Rising Sophomore Abroad Program, as well as other international opportunities available at Virginia Tech. Ambassadors speak to interested college and high school students about their experiences abroad and future international travel plans. The Ambassadors lend a hand at orientation events, information fairs, panel discussions and other functions that highlight international programs for students. The students provide an integral networking and marketing service that goes beyond the scope of what the International Programs Office would otherwise be able to provide.

Garnering input from students can enrich the creation of marketing materials. Often times office faculty or staff do not have the raw materials necessary to create vivid or appealing propaganda. Gathering photos and trip highlights from returning students will allow for more engaging promotional materials. Student reflections tell a story of which others will be more receptive. Students can also assist by distributing posters, pamphlets and other marketing materials about the college's international programs.

While one of the main goals within the college is to increase the number of students participating in international programs, there is also a focus on recruiting more females to the engineering field and we have found that international programs prove to be a great mechanism for recruiting women. Figure 1 below shows the gender statistics within the College of Engineering. In 2008, 83.1% of our engineering students were male, while only 16.9% were women. However, as Figure 2 shows, 42 of the 116 students who participated in international programs within the College of Engineering that year were women. This clearly illustrates that women are very interested in international programs. The International Programs office participates in various events for undergraduate students such as *Women in Engineering* in order to recruit more females to both engineering and international programs. These opportunities to recruit students help to grow the programs, while also providing valuable exposure of the many international opportunities that are available to students.

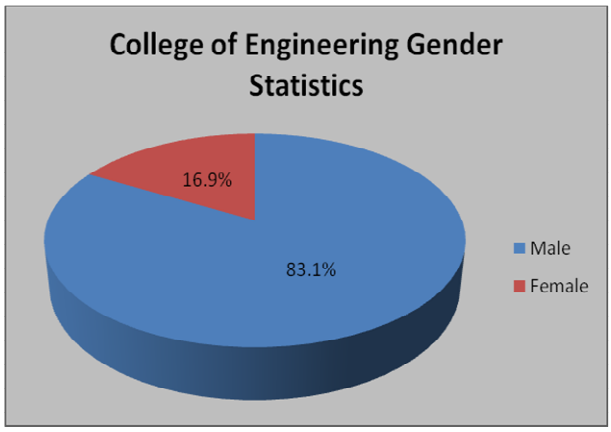

Figure 2. College of Engineering Gender Statistics for 2008

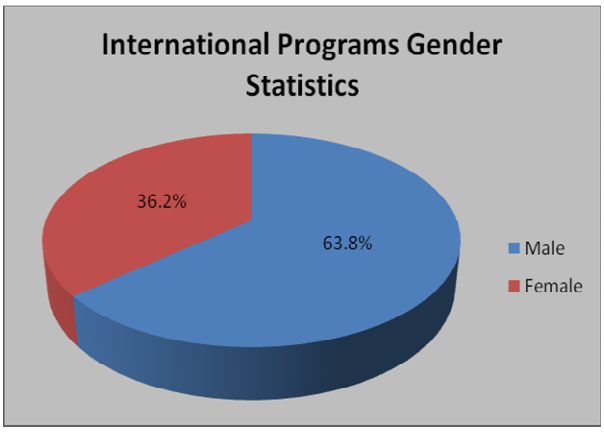

Figure 1. College of Engineering International Programs Gender Statistics for 2008

International Programs Faculty Committee

The College of Engineering is committed to providing students and faculty with international opportunities and experiences related to teaching, learning, research and outreach. As collaborative efforts in science and engineering become more global in scope, it is important to train students to work and flourish in an international research environment and global economy. To further support the College's plan to prepare and support global scholars and leaders with an appreciation for international experiences, the International Programs Faculty Committee was established in 2006.

The committee is representative of faculty with targeted international interests and is open to a representative from each department. Members are appointed by the Dean of the College and their length of term is two years, with terms being eligible for renewal. The committee works closely with the Associate Dean for International Programs and Information Technology to examine, develop and promote the College's participation in international activities. In addition to helping other faculty members create sustainable international programs, the committee is responsible for:

- Facilitating international research opportunities and developing international relationships.
- Leveraging existing international programs, creating new international opportunities, and developing the necessary infrastructure to implement the programs.
- Preparing recommendations, guidelines and disseminating information in the following areas for the College of Engineering:
  - Student travel or study aboard
  - International student recruitment
  - Development of short-term and long-term goals for the College of Engineering International Programs office
  - Assessment of international activities
  - International Programs Alumni Planning Board
  - Help establish contacts for international internships

- Promoting international teaching and research activities to faculty and students within the College of Engineering, University, as well as national and international research and learning communities.

Goals that were developed based upon the Strategic Plan of the College and in accordance to the NAFSA Association of International Educators policies[vi] include:

- Strategically identify and establish new international opportunities following the guiding principles of the committee.
- Develop the necessary infrastructure to grow student participation in education abroad programs.
- All undergraduate programs and 50% of graduate programs will have at least one pre-approved education abroad option that enables students to study abroad for at least one semester or summer without delayed graduation.
- All departments will have at least one international program that enables students to travel abroad for some type of experience whether it is for research, education or work.
- Strategically identify and establish new international opportunities.

Committee members are also responsible for reviewing all proposals for new international programs within the college. Faculty who wish to establish a new partnership must submit an online proposal to the International Programs office for review by the committee. After reviewing the initial proposal, the committee then provides support and guidance to faculty who are initiating an international partnership for the first time. They evaluate Memoranda of Understanding (MOU), Student Exchange Agreements and Collaborative Agreements to make the process more effective and efficient. They also serve as mentors for faculty who are interested in developing their own international programs. This peer mentoring system has proven useful at universities such as Eastern Illinois University where first-time faculty are paired with others with international programs experience[vii]. This assistance has proven to be invaluable, as many faculty members are not aware of all the requirements of initiating a new program, such as a student exchange or collaborative PhD program. The college has seen a significant increase in the number of inquiries from faculty members regarding international collaborations and partnerships. The faculty committee has proven to be essential in assisting the International Programs office with this increase in interest among faculty members.

Universities such as Georgetown University[viii] and Eastern Illinois University have successfully developed similar advisory councils related to enhancing and promoting international education initiatives. In both cases, the groups have added scholarship reviews and financial planning or assistance to their inventory of duties.

In summary, the College of Engineering at Virginia Tech is working hard to produce global engineers who will have the experience and necessary cultural competencies to work with a variety of different people and cultures anywhere in the world. Although budgets are shrinking and overall the economy is experiencing a decrease in travel, there is a noted increase in students interested in having an experience abroad. General interest in study abroad programs and international internships has risen within the college as evidenced by an increase in the number of inquiries received. The key is to capture this interest and make it reality. Creating effective, sustainable international programs and then disseminating the relevant program information to

students can be difficult, but with the help of alumni, students, faculty and staff there are ways to overcome these challenges. Moving forward, the outcomes of the various tactics listed above will be measured by the number of interested students and faculty members and the ability to find them appropriate and meaningful international engineering educational programs. Universities need to continue to focus on finding creative ways to engage the students and provide them with opportunities to have an international experience that will last a lifetime.

[i] Bhandari, P. C. (2009). Promoting Study Abroad in Science and Technology Fields. (P. B. Laughlin, Ed.) *IIE Study Abroad White Papers* (5), 5.

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[iv] Massachusetts, U. o. (2010, January 26). *University of Massachusetts Amherst* . Retrieved March 7, 2010, from International Programs Office: http://www.ipo.umass.edu/index.cfm/index.cfm?FuseAction=Abroad.ViewLink&Link_ID=6DE4C02B-1B78-E111-DC68B8CE1384009B

[v]Service, G. A. (2010, March 3). *Young Ambassadors 2009/2010*. Retrieved March 15, 2010, from The German Academic Exchange Service (DAAD) : http://www.daad.org/?p=ambassadors

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[vii] University, E. I. (2009, December). *Eastern Illinois University*. Retrieved March 4, 2010, from International Education Council: http://www.eiu.edu/~interntl/iec.php

[viii] Georgetown, U. o. (2010, January). *Georgetown University*, Retrieved March 16, 2010, from Faculty Committee for International Initiatives: http://provost.georgetown.edu/35832.html