



Managing a Required International Experience for all Undergraduate Engineering Students at a 4-Year Public University

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Abstract

The Whitacre College of Engineering (WCOE) at Texas Tech University implemented a required international requirement for all undergraduate students entering in the Fall 2013 and after. The international experience requirement may be satisfied by any of the following: [1] receiving course credit (minimum 3 hours) during a study abroad experience (faculty directed programs, traditional reciprocal exchange agreements, or third party programs); [2] participating in an international co-op or internship experience; [3] participating in international service activities (such as but not limited to Engineers Without Borders); or [4] other activities such as international ROTC experience, international experience at a junior or community college. This paper will summarize the strategies employed to build and manage the international experience requirement and as well as highlight the resources required for implementation.

Introduction

For the incoming class of Fall 2013 and thereafter, students entering the WCOE at Texas Tech University will be required to have an international experience before graduation. The international experience requirement is the result of many sources of input and conversations. Alumni have cited the need to prepare graduates for the global workforce, which includes the ability to travel to other countries, respect other cultures and understand engineering through the eyes of other cultures. Additionally, the WCOE believes this requirement will improve recruitment of top freshman and transfer students from peer institutions and other high quality programs.

Historically, the WCOE has had approximately 100 students per year participate in faculty-led or also referred to as faculty-directed programs. Less than 20 students per year have participated in reciprocal or affiliate programs.

The WCOE demographics are as follows. The WCOE has eight different departments providing 10 different undergraduate degree programs including chemical engineering, civil engineering, computer engineering, computer science, construction engineering, electrical engineering, environmental engineering, industrial engineering, mechanical engineering and petroleum engineering.

The total undergraduate population in the Fall of 2013 was 5,861. The foundational engineering students (freshman and students not qualifying for their intended major) is 2,781 students or 47% of the total undergraduate student population. The number of students classified as freshmen (less than 12 credit hours) in the total population was 836. The demographics are as follows. Women represent 14.8% of the total engineering population. In the freshman class, 15.9% of the students are female. The ethnic demographics are as follows. The African-American student population comprises 6.2% of the ungraduated population. Hispanics students encompass 21.6% of the total undergraduate population and the Asian American students are 4.5% of the total undergraduate population. The WCOE is expected to grow to at least 8000 students by 2020. At that population and assuming the total number of international undergraduate students is 10%, approximately 1800 students per year will be abroad fulfilling the international program requirement.

To provide opportunities for the diverse student population as well as supply opportunities for 700 undergraduate students per year, the definition of international experience needed to be broad. Students may fulfill the international experience requirement by any of the following [1] receiving course credit (minimum 3 hours) during a study abroad experience (faculty directed programs, traditional reciprocal exchange agreements, or third party programs); [2] participating in an international co-op or internship experience; [3] participating in international service activities (such as but not limited to Engineers Without Borders); or [4] other activities such as international ROTC experience, international experience at a junior or community college.

Top nine Challenges and Solutions

Implementation of a program such as this is an opportunity for great rewards and great challenges. The top nine challenges are presented below along with the strategies employed to address those challenges. Many of the top challenges identified in this paper are also identified in *Educating Engineers as Global Citizens*¹, which supports the discussion at the summit meeting the paper summarizes. However, this paper identifies solutions to those challenges and discusses the impacts of those solutions. Additionally, challenges such as urgency is unique to the program at Texas Tech University as it means program implementation on the day-to-day. This paper advances the work of Downey and Beddoes², as Downey and Beddoes identifies the challenges and the benefits of a global engineering education. This work provides specific solutions to the implementation problems encountered in globalizing engineering education at a public institution.

1. Building quality, diverse programs that make sense for the WCOE students simultaneously.

Due to the diverse nature of our student body in terms of median income, major, interest in places to study, the need to work to pay their way through school, an array of program options

are necessary. The approach was to consider exchange, affiliate programs, faculty-directed programs, international internships, international co-ops and international service learning opportunities. When making the conscience decision to promote study abroad, the [name of college] originally began faculty-directed programs. Due to the need for faculty to be conducting research and the sheer number of students that would be abroad each year, faculty-directed programs may be a component of the international program portfolio; however, they are insufficient to enable WCOE to meet the goal of an international experience for all students.

The international experience was proposed in Fall 2012 to all of the WCOE engineering departments. The plan was pitched at the department level to provide opportunities for discussion and feedback to improve the proposed plan. In Spring 2013, the international program was adopted and incorporated in the 2013-2014 course catalog so that the requirement could be placed into effect for the entering class of 2013. Due to this timeline, limited work was performed in building programs until the end of the spring semester, which coincides with the hiring of a Director of International Programs for the WCOE. Since the Director's arrival, WCOE has spent quality time vetting programs so that they make sense; however, the need to find quality quickly poses a constant challenge.

2. Trying to effectively build new programs, grow existing programs, advise students and conduct outreach for current/future programs simultaneously.

The International Program Director of WCOE was faced with the challenge managing this large endeavor. Resources from the Texas Tech University Study Abroad office were leveraged to identify programs. Staff advisors and faculty from the different engineering departments were employed to assist with program identification and course approvals; building, growing and advising students for the new program is a daunting task. As such, a new position (Unit Coordinator for International Programs) was created to assist the Director in advising students and growing program options. More specifically, the Unit Coordinator will take on the responsibility of specifically growing international internships and co-ops as well as international service opportunities.

Currently, several approaches are being employed to develop international internship and co-op experience. One approach is to encourage the students to participate in 3rd party provider international co-op and internship experience provided by companies such as Global Links and ISA. The 3rd party co-op and internship opportunities typically include a language and cultural program before the initiation of the work experience and they opportunities have the potential to place students in industries the university's placement office may not have a connection. Unfortunately, these are not paid internships and the student must pay to participate. Their program fee covers the language and culture experience, housing and other costs associated with the program. Internship experiences may also be obtained through university to university

connections, in which the host university has placement opportunities for industry. This approach is often practiced in Korea and Taiwan with major manufacturing companies; however, the student must pay to participate in the program. There is a program fee and the students must sign up for course hours. The internship is also not paid. Lastly, work has begun with the universities alumni to develop internal international internship and co-op opportunities. Several companies have expressed interest and opportunities; however, the opportunities are still in the development phase.

In addition, a program was developed to encourage faculty participation and support of the international program for engineering students. The Faculty Liaison position is a 3 year term to be reviewed and renewed each year. Multiple 3 year terms are possible depending on faculty performance. The expected outcomes are as follows.

- Faculty Liaisons will be expected to make best effort to produce one new functional letter of intent (LOI) per year. The focus is to develop semester long exchanges as reciprocal programs; therefore, the faculty member must obtain course materials (syllabi, course descriptions, program offering schedules) in English.
- As the Faculty Liaison, the faculty member will participate in information sessions for the programs developed to promote student participation in the program.
- The Faculty Liaison will co-host a gathering for the students from the schools they developed the LOI.
- The Faculty Liaison will submit a report by June 30th each year, documenting the activities they have conducted to internationalize the WCOE as well as document their expenditures. The report must also include a proposed action plan and timeline for the upcoming year.

For their commitment, the faculty will receive a travel stipend to their programs and a summer salary stipend to pay for the time they spend working to develop international programs for the students.

Lastly, the WCOE is encouraging students to participate in non-WCOE programs. For instance, the Rawls College of Business at Texas Tech University has faculty-directed programs in Norway and students participating in the program may obtain a certificate in international entrepreneurialism. For students interested in business topics as well as entrepreneurialism, the program is a fun and exciting way to obtain the certificate as well as complete the international requirement.

The WCOE is also seeking to exploit the international activities of other universities and programs and we promote those opportunities to the WCOE students. Most importantly, WCOE works with 3rd party providers to build programs and they map the WCOE engineering program curriculum to the foreign institution's curriculum.

3. The complexity and time needed to form agreements and other institutions urgency vs. our urgency.

Due to the lateness WCOE joined the movement towards study abroad for students, universities have existing international partners and many of those partnerships have gone unused. Many institutions are not interested in new international partners nor do they share our urgency in developing new partners. Other schools have not heard of Texas Tech University and so we do not have the name recognition necessary to advance agreements with those schools quickly. Many universities and cultures place a strong emphasis on trust and relationship building before they sign an agreement. As such, the WCOE must be very diligent in promoting Texas Tech University and the required international experience to convince the international partners that Texas Tech University is a quality institution and an agreement with Texas Tech University will not go unused. We have found the best way to build trust is to visit the schools, use Skype calls and rely on colleagues who are trusted by the other institution to promote Texas Tech University. The Dean of WCOE actively participates in promoting the international experience while on business trips and has visited many institutions to cultivate university relationships.

Administratively, agreements need signatures and review from many parties and this can take time. This is a frustration that can only be mitigated using the strategies identified above and lots of patience. The WCOE has developed a good relationship with the International Office who is happy to help work quickly to advance agreements.

4. Understanding the differences and intricacies concerning foreign institutions.

Ideally, the WCOE wanted to build the international program using existing partnerships and exchange agreements. However, many of those agreements are old and written by a faculty member to advance their particular interests. Where sensible, discussions with current exchange partners were revised to address the entire college rather than a single department. In other cases, some of the existing partnerships have been researched but little success has been had in incorporating the partner in the new strategy. For instance, some of the schools teach limited courses in English, the credit hours are not equivalent to our credit system and the courses do not cover the material necessary for the Texas Tech University engineering students to resume coursework and be successful in the next courses in the course sequence. Thus, WCOE is constantly looking for partners to meet the language, credit hour and coursework requirements to enable study abroad.

5. Faculty members supporting the international program.

Faculty member support of the international program is key to success. Faculty member support is illustrated in their flexibility or lack of flexibility in approving courses from the international partners. In one success, mechanical engineering is approving core mechanical engineering courses (i.e., solids, thermodynamics, statics and fluids) so that other engineering programs such as petroleum engineering and industrial engineer may take these courses abroad. However, the courses will not be approved for mechanical engineering students to take abroad. Faculty members have been very supportive of accepting the international courses as electives and one department is looking to revise the curriculum to create an ideal semester for the students to go abroad, should they choose to use the semester long exchange as their method of accomplishing the international requirement. The WCOE will be working with the other engineering departments and degree programs to rework their 4-year curriculum plan to identify the ideal semester(s) students should participate in a semester-long study abroad experience.

6. Finding ways to make programs as cost neutral as possible.

Another challenge of a required international experience is to make the program for all students so that even the students on financial aid may participate. One way to off-set the cost of the study abroad experience is to use reciprocal partners rather than 3rd party providers for semester-long exchanges. Another way to cut costs includes reducing excursions in faculty-directed programs as well as maximizing the number of students to share the burden of the faculty member's travel, lodging, per diem and miscellaneous costs.

Criteria considered in a selecting program and a partner is the cost. The WCOE selects partners and programs that have a cost similar to a semester of tuition at Texas Tech University. In-state tuition is approximately \$23,000 per year. As such, a semester abroad should not exceed \$10,000. This value limit is a challenge, especially when programs are provided using third-party entities such as ISA, Global Links, etc.

Another consideration in selecting a partner or program is whether or not the partner or program has scholarship opportunities for exchange students. Although limited, WCOE seeks to develop agreements with those entities.

After pitching the proposed international requirement to the members of the Dean's Council, a group of business executives that serve as an advisory board to the Dean, a Dean's Council member started an endowment to supplement student travel abroad and those funds are distributed as scholarships. The same individual also awarded a gift to cover miscellaneous costs to support the program (faculty and student travel) until the endowment generates interest at a level to support the international program.

All students at Texas Tech University pay a study abroad fee. The fee provides scholarship opportunities to students studying abroad. The WCOE students are encouraged to apply for the study abroad scholarship. Additionally, there are external scholarships students may apply to fund their study abroad experience, such as provider specific scholarships as well as the Boren and Gilman scholarships. The Director of International Programs makes students aware of these opportunities and encourages the students to apply.

Alternative strategies to reduce study abroad expenses are being sought. For instance, the Dean's Council members have offered to donate their airline miles to support student travel. Another option is to work with a travel agency to secure the airfare more cheaply due to the volume of business to be provided. The implementation processes for these options are in the brainstorming stages.

7. Working with and motivating students who do not support the initiative or who do not value the international experience.

Not all students are excited about the international initiative and some question why WCOE has implemented such a requirement. The Director of International Programs continually educates students individually, via information sessions and orientations on:

- Alumni's request that our students have more international exposure when entering the work force.
- How highly skilled workers are at the fore-front of the global economy and are requested by their employers to take on international assignments and projects at a higher rate than lower skilled workers.
- How engineering is a global and diverse discipline. Even if graduates are based in the US they will likely be working on an international team.
- How the challenges of studying, working or volunteering internationally will lead to increased independence, maturity and perspective.

A big part of student motivation is peer outreach. The Director of International Programs encourages past study abroad participants to share their experiences at information sessions. The Director of International Programs will continue to explore new and creative ways to leverage the experience of past participants. Now that students who previously would not have considered an international experience will be going abroad there will sure to be "converts" who will be effective peer advisors for hesitant students.

8. Understanding the Director of International Programs vs. the role of the Study Abroad Office. How can we work together effectively and efficiently?

To make all of this work, partnerships are essential and the key partnership is between the WCOE Director of International Programs and the Study Abroad Office. Both offices are relatively young, with newly hired personnel. Therefore, the learning curve is steep for everyone and the corporate memory of the job positions is minimal to non-existent. Due to the international requirement, the number of students WCOE is proposing to send out each year will equal the number of students the Study Abroad office has sent out annually for the entire university in previous years. Therefore, the Study Abroad Office is also brainstorming ways to assist the WCOE in developing and promoting a broad range of international experiences for the students. The Study Abroad Office values the WCOE's goal of internationalizing the engineering college and seeks to assist in any way possible. As such the partnership has a common goal; the challenge addressed each day is how to chart a path forward that makes sense from a workload and labor distribution point of view.

9. Providing alternatives for students who cannot go abroad or believe they have already fulfilled the international experience requirement.

To address, we developed a process for students to waive or substitute the international experience. In the case of the waiver, students must provide documentation of the hardship the international experience would provide to them or their family. More specifically, the waiver may be pursued and approved if the student can demonstrate one or more of the following.

- Financial hardship as demonstrated by a FASFA,
- Health conditions that do not permit long-term travel without doctor's care,
- Other conditions such as but not limited to birth of children, responsible care of a family member, family hardship, etc.,
- A student visa that does not permit participating in a study abroad experience or an international student,
- A transfer student with 60 or more engineering or computer science hours accepted by Texas Tech University or a second degree student,
- A student athlete whose athletic season prohibits extended travel,
- Substitution of another international experience satisfying the requirement, or
- Other to be reviewed and approved by the International Program Review Committee and the Associate Dean for Undergraduate Studies.

Although not explicitly stated above, the waiver allows WCOE to work with students who may be illegal aliens and are unable to obtain a passport. Another group of individuals serviced by the waiver are students who cannot obtain a passport due to criminal activity.

For the substitution, the student must seek permission to pursue the substitution route. Upon receiving initial approval, the student must write a report. To substitute another experience, the student must describe the activity they participated in while abroad and must provide a schedule

of time committed to those activities. The key is for the students to connect their international experience to their engineering past, current or future course curriculum and demonstrate the connectedness between the activities and engineering. Accompanying the report, the student must submit a letter verifying the country visited, duration of the visit, activities performed and the reference writer's credentials.

Conclusion

The WCOE at Texas Tech University has implemented a required international experience for all students entering the institution Fall 2013 and after. The study abroad literature includes suggested benefits to students who participate in study abroad programs. The hope is that the benefits translate to the Texas Tech University students even though the international experience is required instead of options. Benefits include the following.

- Study abroad experiences in the early stages of a student's career statistically improve 4 year, 5 year and 6 year graduation rates, with the greatest improvement in the 4 year graduation rates.
- Student with a study abroad experience have higher GPAs at graduation than students that did not study abroad.
- Study abroad experiences have shown to improve retention of underrepresented groups.

In addition to positively benefiting the students, the hope is that the international and study abroad experiences benefits the departments and WCOE. One benefit may be that the study abroad experience may serve as an enrollment management tool when more students are sent out then are received by the home institution². By sending students abroad, universities all over the world will know of Texas Tech University and faculty and research exchanges may blossom from the success of our undergraduate students in their programs. Lastly, the WCOE hopes the mobility of the students will result in better employability and as such other companies will consider recruiting Texas Tech University 's students.

Due to the newness of the program, little data is available on the impact of the program on Texas Tech University's students. The Fall 2013 entering cohort is the first class required to fulfill this the international program graduation requirement. Students do not typically go abroad their first year, so impacts of the experience on the student will best be assessed in two or three years. The assessment process is in development.

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