



Best Practices in Globalizing Engineering Students

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Abstract

In the fall of 2013, Texas Tech University (TTU) and the Edward E. Whitacre Jr. College of Engineering (WCOE) implemented a requirement for all undergraduate engineering students to participate in an international experience as part of their degree plan. The intent behind this initiative is to facilitate the preparation of future engineers at the college level to become part of an ever-increasing international profession.

In the implementation of the International Experience Initiative (IEI), the members of the International Engineering Programs (IEP) Office discovered a series of best practices to help globalize engineering students. These best practices include leveraging advisors and peer advisors called the Engineering Diplomats to educate and recruit students on their international opportunities, the marketing of programs, and maximizing partnerships and creating customized programs.

Marketing is an essential tool needed to promote programs. Since the IEI's inception, IEP updated its website, created flyers for all programs, and established email marketing for engineering students. Throughout this paper, we will provide examples of creative material, data on the increase in student participation and of web traffic as a direct result of marketing.

Through partnerships with providers, IEP collaborates to create diverse programs that meet student interests, personal needs, and future career goals. This is done by examining past, present, and future programming with specific partners. In the past, IEP created an ongoing summer research exchange with Universidad del Norte (UniNorte) using the support services of International Studies Abroad (ISA). Today, IEP and Butler University Institute for Study Abroad (IFSA-Butler) collaborated to create a program that has curriculum available for multiple universities that focuses on engineering and culture. Looking toward the future, IEP and Cultural Experience Abroad (CEA) are creating three geographically diverse programs while integrating engineering curriculum and cultural immersion.

Background

Texas Tech University (TTU) was founded in 1925 and located in Lubbock, Texas. The 2015 U.S. World and News Report ranked the Engineering program 94th as one of the “Best Engineering Schools” in the United States. Since 2010, engineering student enrollment has increased more than 32.3%. Within the Whitacre College of Engineering (WCOE) there is an office dedicated to the International Experience Initiative (IEI) called International Engineering Programs Office (IEP). The WCOE is committed to providing our students with quality international engineering experiences that prepare them to work in a global environment. In addition to increasing students' global perspectives, an international experience will be one of the most memorable times of their lives. The chart below is an overview of the organizational structure within the IEP office.

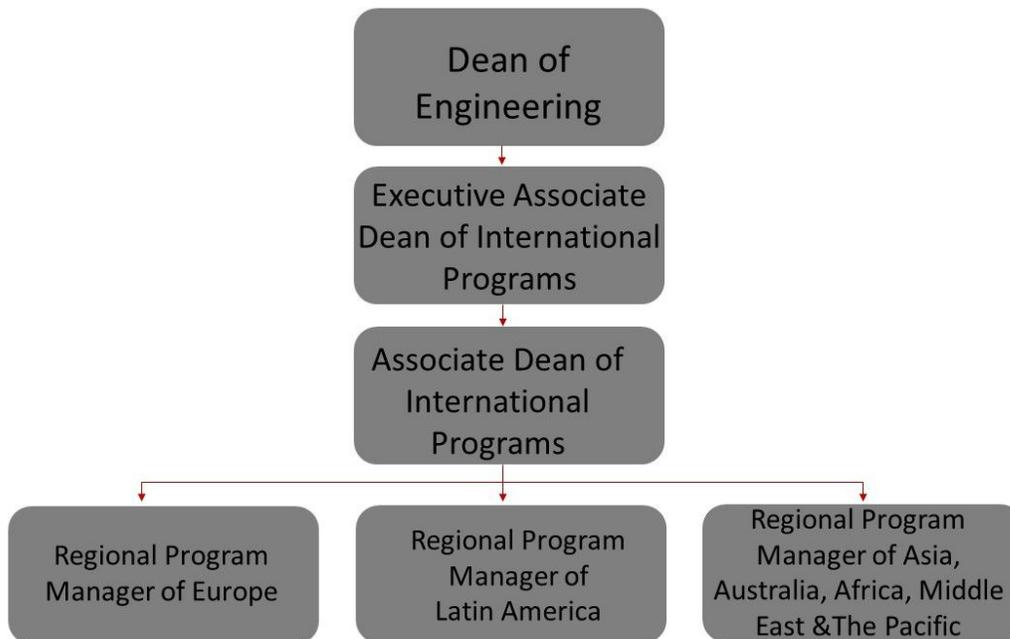


Figure 1.1: International Engineering Programs Office Organizational Chart

Going abroad is still an area of improvement in the United States. Currently, less than 1 in 10 American students have an international experience during their academic career (Bidwell, 2014).

Statistics have shown:

- 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 a student that did not study abroad.
- Study abroad experiences improve retention of underrepresented groups, such as engineering (Rhodes and Sutton, 2012).

Although there is room for improvement to get American students abroad, a positive trend is the increase in student participation in the STEM field. In the last two years, more STEM programs have been

developed and more STEM students have gone abroad than in previous years. It's been reported that STEM students have outpaced all other fields in U.S. Higher Education in going abroad (Bidwell, 2014). The chart below shows the increase in STEM participation abroad. This report is from the Open Doors Report of 2014.

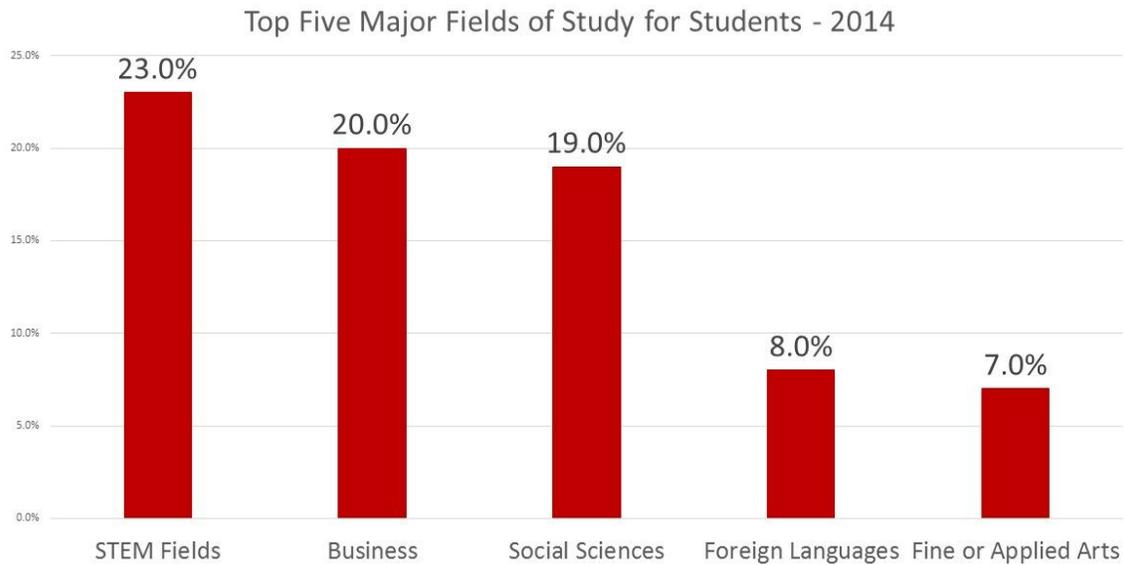


Figure 1.2: Students Going Abroad 2014

Looking at these trends, the IEP Office is dedicated to preparing its graduates for the ever-changing global landscape, therefore starting in fall 2013 the WCOE at TTU implemented an international requirement for engineering students. This was created to prepare engineering students to work in a global environment where they will need to learn new communication styles, work with others from different backgrounds (Hurt, 2015), and will set them apart from other engineering graduates (WCOE, 2012). Students can complete the requirement in four different ways: study, intern, research or service abroad. Study continues to be the most popular with 97.3% of students choosing this method. An additional 1.4% of students choose internships, followed by 0.3% for research, and 0.9% for service. Since the requirement was implemented (fall 2013) there has been a 25% increase in engineering students going abroad.

The requirement guidelines vary based on the student's catalog. Students who entered between fall 2013 and summer 2016 must have the equivalent of three credit hours abroad. Beginning in fall 2016 students must be abroad for a minimum of six weeks. This change came from the desire for TTU engineering students to gain further cultural immersion.

The international requirement compliments the Office of International Affairs' strategic goals to

- “increase the number of students studying abroad to 4,000 per year”
- “identify two appropriate study abroad programs for each major offered on campus”

- “encourage semester-long programs through establishing course equivalencies in all degree plans” (Office of International Affairs, 2014).

In order to develop a successful international department, best practices need to be in place. This paper will focus on a couple of the best practices in the implementation of the international requirement. These best practices are from the IEP advisors’ experiences over the past two years working in the WCOE. These topics are leveraging advisors to educate and recruit students on their international opportunities, marketing of programs, and maximizing affiliated partner relationships through the creation of customized programs.

Best Practices: Advisors and Peer Advisors

The IEP has found one of the best methods of informing students on the international requirement is to have a unified message from key allies within the WCOE. Two of these allies are academic advisors and peer advisors also known as Engineering Diplomats.

Best Practices: Advisors

In the WCOE, students must meet with their academic advisors in order to register for the next semester. The IEP found that working with academic advisors is one of the most consistent ways to reach students and promote programs. Academic advisors know all the idiosyncrasies of the engineering and computer science degree plans including course prerequisites, course sequence, and if courses on campus are full. Previously if courses are full on campus and being offered abroad, IEP and academic advisors have worked together to encourage students to take the course abroad. The IEP and the Lead Academic Advisor work closely together and attend the same monthly meetings, where IEP disburses program flyers that are specific to each advisor's’ major. These flyers are hung up in academic advisors’ offices where students can see them. Attending monthly meetings allows for the exchange of information, building personal relationships with the advisors, and keeping the lines of communication open. These open lines of communication are especially important when working on student’s applications and making sure they remain on track in their degree plans. It is also important when a difficult situation arises, such as a student does not meet the program or course requirements to communicate with the advisor. The IEP has experienced students trying to go around either set of advisors to participate in a program they are not qualified for. This is mitigated by communicating when issues appear.

Academic advisors are invited to the breakfast every fall semester before the Study Abroad Fair. The IEP personally invites each advisor to attend and sends email reminders leading up to the event. During this breakfast affiliated providers and faculty-led program professors can discuss their programs that work for different disciplines. After the breakfast, there is time to socialize and IEP advisors introduce academic advisors to affiliated providers best suited for their students’ needs. The IEP is the only office on campus that brings academic advisors and affiliated providers together and has received positive feedback from both groups. Both parties have the opportunity to learn from each other, ask questions, and contribute ideas for new programs.

Best Practices: Peer Advisors

As discussed in NAFSA's Guide to Education Abroad (2005), peer advisors can be the best ambassadors for programs in which "they participated and for education abroad in general." With this in mind, the Engineering Diplomats were created in summer 2014 as the ambassadors of the IEP. They are a recognized student organization using students who have already completed their international experience requirement. One of the main purposes of the organization is to help the WCOE achieve its goals regarding its international initiatives. The organization is overseen by an IEP advisor. Currently, the Engineering Diplomats are comprised of 12 active undergraduate members which include a five person officer group. Members receive a scholarship each semester and gain experience in organizing and planning events, recruiting and hosting information sessions. The Diplomats advise their peers to achieve the recruiting expectations of the WCOE (Student Organization Proposal, 2014).

Diplomats undergo a rigorous selection process that includes a GPA of 3.0 or higher, having spent a minimum of one long semester on TTU's campus, and a panel interview with the current officers (Student Organization Proposal, 2014). After they have been selected to the organization, Diplomats undergo thorough training (NAFSA, 2005) by the organization's advisor every semester. Training includes a two hour session with the advisor discussing the advising process, programs, the IEP website, and expectations. Senior Diplomats are paired up with new members to help them learn about IEP policies and best practices to promote programs.

Duties of the Diplomats include:

- Weekly office hours
- ENGR 1315 classroom visits each semester
- Two to three major or location specific information sessions a semester
- Two general information sessions a semester
- Attendance at WCOE Events, such as the Study Abroad Fair, Job Fair, and Kick-Off
- Assistance in IEP events, such as program meetings

Between 10:00am to 4:00pm from Monday to Friday, the Diplomats have office hours. These hours have been strategically placed in the front office of the Engineering Opportunities Center (EOC). The EOC is a location within the WCOE that offers resources on tutoring, career opportunities, community, and retention (Engineering Opportunities Center, 2016). During these hours, students can walk-in and ask general questions to the Diplomats. Popular program marketing materials are available for Diplomats to hand out and they utilize computers to help students navigate the IEP website. These three things are some of the largest uses of time for IEP advisors and by utilizing the Diplomats, IEP advisors are able to work on projects and other duties.

The IEP has worked hard since the organization's creation to grow membership, expand duties, and increase their presence within the WCOE. The Diplomats have a distinct logo and polo worn during office hours. Diplomats are also featured on the IEP website, utilize contacts in residence life to present in the residence halls, and attend other events. Due to these efforts to increase their presence, Diplomats are identified outside of their office hours as a resource to students. Several have reported students asking them questions on their walk to class and off campus.

Best Practices: Marketing

Marketing is an essential tool needed to promote programs. “For education abroad to become a more viable, visible, and prominent part of undergraduate education, the field needs to learn to use appropriate promotion and publicity tools to build support in every way possible, on and off campus” (NAFSA, 2005).

The IEP focuses on different types of marketing strategies. “There are three simple rules to successful promotion: variety, repetition, and appropriateness” (NAFSA, 2005). By offering a wide range of strategies this allows the IEP to create variety in the message and tone, have consistent repetition and establish the appropriate message based on the targeted audience that is being reached. These strategies are:

- Revised Website
- Promotional Materials
- Email Marketing and Newsletter
- Social Media
- Attending Events/Info Sessions

The WCOE is consistently working on collecting student feedback and accurate data for programs. “Collecting and reporting accurate study abroad data is one of the most compelling ways for study abroad offices to demonstrate how they support the mission of their campus and contribute to the educational experience of their students” (NAFSA, 2016). The TTU engineering students are constantly asking the IEP, Diplomats and the academic advisors on where they can go to not only fulfill their international requirement, but also not fall behind in their degree plan. Therefore, the IEP generates updated data based on the student information pulled from their online application. This data is used to educate the Diplomats and academic advisors. An example of the IEP data is located in figure 1.3.

These figures show the second and third top locations by major where students have fulfilled their international requirement. Spain is by far the most popular option for students because it has been the main faculty-led program location. Although, moving forward the IEP wants to grow student participation in other programs such as Latin America, Asia and Australia. This is why the data is primarily focusing on the top two and three destination for engineering students (keep in mind foundational students are mostly freshmen students who have not met the requirements to declare an engineering major).

From this data, it shows Europe is the most desirable and course efficient regions for TTU engineering students

Chemical ENG	9.6%	Civil ENG	7.7%
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Location	Percentage
Italy	1.4%
Czech Republic	0.2%

Location	Percentage
United Kingdom	0.7%
Italy	0.5%

Electrical/ Computer ENG	Percentage
	3.6%
Location	Percentage
Ireland	0.4%
Italy	0.4%

Computer Science	Percentage
	1.6%
Location	Percentage
Ireland	0.4%
Greece	0.2%

Construction/ Environmental ENG	Percentage
	2.5%
Location	Percentage
Germany	0.3%
Italy	0.2%

Foundational ENG	Percentage
	35.6%
Location	Percentage
Italy	4.6%
Ireland	1.5%

Industrial ENG	Percentage
	3.1%
Location	Percentage
Germany	0.4%
Italy	0.4%

Mechanical ENG	Percentage
	27.6%
Location	Percentage
Germany	2.9%
Colombia	1.5%

Petroleum ENG	Percentage
	8.8%
Location	Percentage
Germany	0.7%
Italy	0.4%

Figure 1.3: The data was pulled from spring 2014 to fall 2016 programs.

Website

The feedback that was given from faculty, staff, students and parents was one of the main reasons as to why the IEP decided to revise its website. The goal for updating the website was to make it more user friendly. One of the initial major changes was creating a world map on the front page that shows all the different areas students could go to fulfill their international requirement. The map is also color coordinated by area of interest such as, study, internship, research and service abroad. The tool bar was also updated to help provide users an easy way to explore important resources such as dates and deadlines, contact information, scholarships and frequently ask questions. During the redesigning stage, the IEP, the WCOE marketing team, academic advisors, and the Diplomats beta tested the website from an advisor, a recruiter, and a student's point of views. Since the majority of the traffic is from TTU engineering students, using the Diplomats was an essential tool needed in providing the appropriate feedback. When IEP first introduced the new website, an email was sent out to 4,989 undergraduate and graduate engineering students. From that number, 2,683 students actually opened the email and clicked the link to view the new website. The website went live in January 2016 and since then IEP has received positive feedback from faculty, staff, students, parents and partner institutions.

Promotional Materials

A new initiative that IEP started this past year was developing a "Guide for Going Abroad" one-sheet for its students. On this one-sheet, there is detailed information on the appropriate steps a student should follow when going abroad. The one-sheet is laid out in a color coded chart form and checklist. The TTU engineering students respond well to charts due to the fact that most of their degree plans are set up as a chart system. The color coded information is to help the student understand what their responsibilities are and who oversees that portion of the application; and the checklist is helpful for advising. During Diplomat peer advising or IEP advising the advisor will go over the checklist with the prospective student to make sure the student understands the appropriate steps to take and what still needs to be done. Incorporating both styles helps with reaching different learning styles for TTU engineering students.

Our main promotional material that we use are highlighted program focused flyers that have a distinct look. The IEP flyers are either made by the IEP or sent from affiliated providers. The flyers include a photo, location, dates, deadlines, pricing, contact information and academic information. It has been found that the key to making a successful flyer for TTU engineering students is to include course information for each program. If the course information is not included it will be the first question that is asked from the student. The IEP uses the flyers at all recruiting events, fairs, orientation, information sessions and general engineering events, as well as, during Diplomat peer advising, academic advising and IEP advising. Even though IEP is moving toward a more digitally focused industry it's still found that there is a demand from students for paper materials. With the flyers, the IEP has created a business card with a QR code that takes you to the website.

Email Marketing & E - Newsletters

The IEP office obtains a bi-weekly report that shows all TTU undergraduate engineering students who have not fulfilled the international requirement. The IEP uses this report to tailor messages targeted to those students who still need to go abroad. The emails consist of informing students of future events, fairs, information sessions, and deadlines. Announcements of new programs with the attachment of the program specific flyer is "one of the most useful functions of email" marketing (NAFSA, 2005). Another

initiative that has been in the works is establishing an e-newsletter for the IEP office. The focus of the e-newsletter would include things like, featured stories, featured programs, student testimonials, important dates, international student involvement, financial aid and scholarship information, and general abroad facts.

Social Media

The IEP has a dedicated Facebook page for its TTU engineering students. The page was created in summer 2013 and since then the page has received 330 likes. This is a continuing project of the IEP and after the fall 2015 IEP photo contest the facebook account increased in its numbers. The IEP office posts daily on program information, information sessions, study abroad memes, study abroad articles, etc. During the fall 2015 semester, the IEP office found that providing images with all articles and/or links has resulted in an increase in clicks from the TTU engineering students. For example, the image below of Spongebob Squarepants was related to an extension date for our Chile programs. The headline was, “There’s still time to apply to Chile programs! The deadline has been extended to this Friday”. Within 15 hours it had reached 90 people.

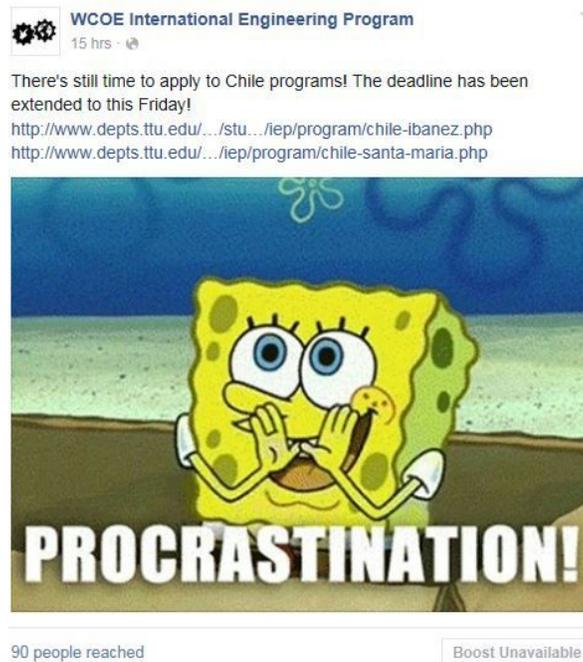


Figure 1.4: Facebook Meme Example

Another marketing tactic that the IEP found successful was using the program flyer as the image to inform students about their opportunities. The IEP did this with three different programs and all three different post received over 160 clicks. Areas of growth that has been started or plan to start in the future are, having an active blog site, utilizing twitter and the creation of an instagram account.

Attending Events

The IEP has a goal of sending 720 students abroad each year. Only relying on social media and email marketing is not enough promotion for this size of group. “Good and effective promotion involves

knowing the target market” (NAFSA, 2005). Therefore, IEP attends every event that is held for TTU engineering students. These events included, but are not limited to; Freshmen and Transfer Orientations, Resource Fairs, Welcome Events, Study Abroad Fairs, Career Fairs, Engineering Week, International Week and others. The Engineering Diplomats also provide weekly information sessions and give presentations to all introductory engineering courses at the beginning of each semester.

Best Practices: Utilizing Provider Relationships

Since there is a goal to send out 720 students a year, one way to reach this goal is to leverage TTU’s partnerships with its affiliated partners. Affiliated partners offer a wide array of programs for a large amount of students and usually at a lower cost than faculty-led programs (Moseley, p 3). In addition, it is important to use providers that already have contacts and logistical support in a region when designing programs (Spencer and Tuma 2007). Currently the WCOE is working extensively with three separate partners, International Studies Abroad (ISA), Institute for Study Abroad-Butler University (IFSA Butler), and Cultural Experiences Abroad (CEA) to create customized programs in the summer to fit a variety of engineering majors. The following are some examples of programs created with providers.

Past

The IEP’s original customized program is with ISA and the Universidad del Norte (UniNorte) in Barranquilla, Colombia. The program stems from the 100,000 Strong in the Americas initiative. A joint research exchange of five engineering students in the areas of mechanical engineering (ME) and electrical and computer engineering (ECE) with a focus on renewable energy. This eight week program features five students from both universities. Starting in the first week, students from Texas Tech traveled to Barranquilla and spend one week at a research symposium with UniNorte students and researchers to discuss potential topics. At the start of the second week, the UniNorte students traveled to Texas Tech to begin their research, while Texas Tech students remained in Colombia to begin their research. Over the course of the subsequent six weeks, students worked in their research areas and took a course to supplement their research and to fit in with the theme of the exchange. At the end of the seventh week, TTU students traveled back to Texas Tech to join the UniNorte students for a research poster presentation (Gracia and Wright, 2015). This presentation was open to the TTU community and included attendance from students, faculty, and staff in the WCOE.

In Colombia, Texas Tech students were housed in homestays as a way to become culturally immersed in society. The ISA provider acted as the on-site logistics coordinator of the customized program. In Texas, UniNorte students were housed in TTU dormitories as a way to experience university life in the United States. Both groups had additional cultural activities to facilitate further cultural understanding. In Colombia, ISA was further utilized for these activities. In Texas, a member of the WCOE acted as the coordinator of cultural activities. In the planning of this research exchange program, representatives from both institutions and the provider travelled to both locations to explore facilities and community (Gracia and Wright, 2015).

While five students were planned for each group, TTU was able to send three students and UniNorte two students. Given that this was the first year of the program, both institutions expect the numbers to reach the full five students and perhaps expand program numbers in the future.

Present

Currently, IEP is partnering with IFSA-Butler for a program located in Derry, Northern Ireland and open to non-TTU students. This program began with representatives from IFSA-Butler and IEP discussing the issues of sending engineering students abroad and potential semester long options. One of the main issues discussed is how difficult it is for engineering students to go abroad for a semester due to their “semester-by-semester academic planning and internship expectations” (Hurt, 2015). Considering capacity and costs, the University of Ulster for a six-week summer session was decided upon. The IEP staff looked at courses needed for a wide variety of engineering students and selected Dynamics and Microcontrollers as the engineering courses to be offered. Dynamics is needed for mechanical, civil, industrial, and petroleum engineers. Microcontrollers is needed for electrical and computer engineers and computer science. Students select either Dynamics or Microcontrollers and pair it with an Irish Studies course. This course focuses on the history and culture of Ireland and culminates in a one-week cultural stay in a Gaelic speaking community.

All three groups work together to provide program components. The University of Ulster provides the delivery of the academic content, use of academic facilities, and on-campus housing. IFSA-Butler provides the logistics of the program including orientation, cultural excursions, visits to engineering firms in Northern Ireland, and 24-hour emergency support. TTU provides the syllabi the courses are based off.

To set it apart of other customized programs in the IEP portfolio, this program is listed on IFSA-Butler’s website and is open to non-TTU Engineering students. There are several benefits to having the program opened to non-TTU students, including not needing to rely on TTU to meet the minimum program participation numbers, keeping the program cost low, and student diversity. As of March 1, 2016, 22 students had applied to the program.

Future

Looking toward the future, IEP and CEA are planning on creating three geographically diverse programs while integrating engineering curriculum and cultural immersion.

“Producing globally competent engineers for the 21st century is increasingly important in a world that is ‘flat’ and more globally connected. Engineers are now facing the distinct possibility that they will be working for a multinational company, or NGO that requires multicultural awareness, some degree of foreign language proficiency, and the ability to communicate effectively across cultures and time zones” (Kennedy & Jones, 2015).

These geographical areas include; Paris, France, Buenos Aires, Argentina and Shanghai, China.

At the CEA Center in Paris, students must take oral communication and calculus III. These courses are chosen because it fulfills the degree requirements for all TTU engineering and computer science students. In Paris, students will stay in shared apartments for six weeks with CEA coordinating all on-site program logistics. This is the first year the IEP office has ran this program and there are 11 TTU engineering students participating in this program. In the future, the CEA program will be modified so that TTU can

collaborate with other U.S. Higher Education Institutions and make this program open to students outside of TTU. This will help generate more student participation, as well as, become more cost effective. TTU is also expanding into a semester-long program at this location.

In Buenos Aires, Argentina at the University of Belgrano, students will take one engineering and one culture course. The program will be six to eight weeks in length, students will live in homestays and participate in cultural excursions. These program logistics have yet to be finalized but is on the agenda to be finalized later in 2016 and to run in summer 2017. Similar to other programs, CEA will coordinate on-site logistics.

At East China Normal University in Shanghai, China students will study over the course of ten weeks taking an East Asian Studies course and an engineering course. The engineering options are currently being researched based on the desire to collaborate with other U.S. Higher Education Institutions; this will help with student participation and the cost of the program. Students in this program will be housed on campus. On-site logistics such as, cultural excursions including a trip to Beijing, and communication with other institutions will be coordinated by CEA. The IEP is working closely with CEA staff to create, promote, and recruit for the program and hopes to have a minimum of 10 TTU student participants.

Conclusions

According to a World and U.S. News report, “For the first time, American students studying abroad who are pursuing STEM fields outnumber those in every other field of study” (Birdwell, 2014). The WCOE at TTU continues to strive to create great engineers, and with the establishment of the IEP office, this not only helps the students with the requirement, but also makes them stand out from other U.S. Higher Education Institution graduates.

At TTU there is a high turnover of academic advisors and to keep a consistent message, IEP will continue to maintain relationships with all advisors. The IEP hopes to grow the member numbers of the Diplomats and remain updated on IEP policies and programs. The IEP will utilize current marketing strategies, grow social media, and remain current on marketing trends.

With the establishment of WCOE international requirement and the growth of STEM abroad, the IEP office is consistently working on best practices and program growth for its engineering students. One area IEP would like to expand further is internships, service, research, and semester long programs. Each of these areas will take long-term planning in order to accomplish good results.

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