122nd ASEE Annual Conference & Exposition
June 14 - 17, 2015
Seattle, WA
Paper ID #11878

# Maximizing the Global Experience: Lessons Learned from Running a Faculty-led Program to Brazil

**Dr. Courtney Pfluger, Northeastern University**

Dr. Courtney Pfluger received her Doctoral degree in Chemical Engineering from Northeastern University in 2011. In the fall of 2011, she took a position as an Assistant Teaching Professor at Northeastern University in the College of Engineering as a part of the First Year Engineering Faculty with a focus on chemical engineering. She teaches the first year courses where are Engineering Design and Engineering Problem Solving. She also teaches senior Chemical Engineering Process Controls. She runs a faculty led international summer program to Sao Paulo, Brazil which focuses on Alternative Energy Technologies and Brazilian Culture.

# Maximizing the global experience: lessons learned from running a month long faculty-led program to Brazil

## Introduction

Globalizing the classroom and giving undergraduate students an international experience has become extremely popular in the past few years. In the 2012-2013 academic year, U.S. students studying abroad increased by three percent in just one year to an all-time high. Study abroad by American students has more than tripled over the past two decades[1]. Universities are realizing the great benefits for their students to have an international experience while in college. These benefits include but are not limited to, becoming globally aware and global citizens, more personally and socially aware, and strengthening their career and academic choices. A study performed by Williams in the Journal of Studies in International Education found that students who went on study abroad exhibited a greater change in intercultural communication skills after their semester abroad than students who stayed on campus. They also found that exposure to various cultures was the greatest predictor of intercultural communication skills[2,3]. This is especially true for engineers, who have a focus on solving global problems and therefore need the ability to work knowledgably and live comfortably in a transnational engineering environment and global society[4]. Studying abroad will strengthen engineers' global competence and prepare them for the communication skills in a global society[5]. With all of these benefits, it is no surprise that many of these international experiences are growing in Universities all over the US. However, these programs can be daunting to start up by a sole faculty member. This paper will discuss the start-up lessons learned running a faculty-led study abroad program to Brazil including expectation management, inclusivity of diverse student populations, and language barriers. Anecdotal evidence from students' blogs about their journey will be highlighted to demonstrate that the improvements to the program were translated to student fulfillment and experiences during the study aboard experience.

## The Program

The program at Northeastern University is called a Dialogue of Civilizations (dialogue). These are faculty-led international experiences for students that are 4 to 5 weeks in duration occurring during the summer. This particular dialogue was developed with a focus on one of the engineering grand challenges, sustainability. It is known that in Brazil over 80% of the energy that is in its grid comes from renewable energy sources. Brazil also has a rich culture and rapid development that would be of global interest to students.

Two courses are taught in country during these programs to total 8 credits towards the students' degree. The two courses taught for this program were a 1000-level introductory engineering course called Alternative Energy Technologies and a course on Brazilian Culture. The alternative energy course was taught by the lead faculty member from Northeastern University and the Brazilian culture course was taught by a professor who was hired in Brazil. An international study abroad company helped facilitate and organize outings and company visits while in country. Below is a comparison of the number of student per major from the first (2013) and second time (2014) the program was run.

| Major | 2013 | 2014 |
|---|---|---|
| Engineering | 14 | 14 |
| Business | 3 | 2 |
| Biology | 2 | 1 |
| International Affairs | 2 | 0 |
| Cultural Anthropology | 1 | 0 |
| Environmental Science | 0 | 7 |
| **Total # Students** | **22** | **24** |

Table 1: Table comparing the number of students per major for each year the program was run

The Alternative Energy Technology Course

**Development and First Time Taught**

The alternative energy course was specifically developed for this dialogue. The course was originally designed to have scientific content that would be accessible to non-engineers but interest engineering students. The course consisted of lectures on the basic physics of work and power, energy sources, and alternative energy technologies. In addition, there were 5 visits to alternative energy companies in Brazil. The course aimed to cover alternative energy systems and their impact the environment. It emphasized how energy resources and analyzed growth, distribution, environmental and socio-economic issues of these technologies in the US and Brazil. The course aimed to explain relevant alternative energy technologies in an interactive environment, where students engaged in the field visiting companies and examined its impact on Brazil's society by speaking with industry leaders.

While running the course the first time, there were conversations with students on how the course was progressing. After two weeks into the course, the engineering students said the course was too basic and the non-engineering students said the course was too difficult. One comment from an engineering student from the course:

*"The course had an interesting topic but it reviewed basic topics on energy I already knew a lot about. I think it would have been better if we taught each other about what we know and research together what we don't know."*

Another comment from a non-engineering major:

*"I felt overwhelmed by the physics and I got confused easy. I felt like I didn't know as much as the engineers and that made me feel like I couldn't contribute as much as they could during the course."*

After listening to these comments from the students, changes were made to the course immediately, where the students were put into groups of mixed majors and years. They were asked to research and present to the rest of the class on an alternative energy topic which discussed: how the technology produces energy, what effects it has on the environment, what

polices are in place in Brazil and U.S. on this technology and how it effects the economy and society of each country.

After reading the evaluations from the students at the end of the course, it seemed the changes with the research and presentations were beneficial for the non-engineering students and some aspects were good for the engineering students. One evaluation from an engineering student after the end of the course that was run the first time:

*"The plant visits were great! We saw the Henry Borden Hydroelectric plant, Tanquinho solar power plant, and a smelly Sao Joao landfill. The class itself was pretty bad. There were some materials presented to us in the form of documentaries and 2 scholarly articles, which gave us something to actually learn from. The textbook was also good, but could have been incorporated better. Most of our class time was spent teaching each other through group presentations, which was good for our presentation skills, but didn't have much depth."*

The comment above shows that the students found that the plant tours were beneficial for their learning but that the engineers felt like they were lacking the in-depth topics on alternative energies they were looking for. In contrast, a comment from a non-engineering student about the course is below:

*"When it came to the classroom and the activities regarding alternative energy, it was interesting to hear my classmates talk. I was so impressed by, and even jealous at times of their technical and economic knowledge. I liked hearing their input in class. I have taken many courses on sustainability before, so it was nice to be able to contribute some viewpoints to the conversations in class."*

Evaluating this comment, it seems the changes in the course helped the non-engineering students feel as though they were able to contribute with the conversations in the end but they felt like they didn't know as much about the topic as the engineers. Using these comments from the students, improvements to the course were then made for the next time the course is taught to make the engineers able to get more in-depth knowledge on alternative energy topics while incorporating group research projects to help the non-engineers learn from the engineers on certain basic topics, which will be discussed next.

**Improvements and Second Time Taught**

Restructuring and overhauling of the course was performed before the second time the dialogue ran. After evaluating the student comments about the course from the first time it was run, speaking to other faculty who run a similar program, and doing a literature search, it was determined that a project-based course would be more beneficial to have the students learn from each other by working in pairs or teams. Using some of the aspects of interdisciplinary projects for a study abroad project outlined in paper by DiBiasio and Mello, the course was restructured to be a project-based learning course where students were paired by differing age and majors[6]. The idea behind this new structure is to allow students to teach each other using their expertise and to research new topics together and then teach the rest of the class what they learned about a certain technology. The improved course included 4 projects:

Project 1: In pairs, the students were given an alternative energy technology and asked to make a wiki page detailing: how the technology works; give examples of what technologies exists; what are the negative and positive impacts on the environment, economy, and society; what policies or subsidies for these technologies are in US and/or Brazil.

Project 2: The same pairs will then present on 3 ways that their technology could be implemented in Boston, MA. They are asked to calculate how much energy could be generated to meet Boston's demand and how much oil and coal would Boston not use by using this technology.

Project 3: Performing a mock hearing of the U.S. Senate Committee for Energy and Natural Resources to approve the Hawaii Clean Energy Initiative on a specific parcel of public land. The class would be split into different groups with differing opinions on the subject, such as Investors, Locals, Policy Makers, Environmental Protection agency, etc. The students were asked to research and strategize and then in class debate their side of the initiative.

Project 4: In groups of 3, the students are asked to design an alternative energy proposal for a city. They are asked to propose a plan to reduce the amount of fossil fuels that a city uses for both electricity and transportation. They are asked to write a proposal to the major of the city explaining the need for alternative energies to be implemented more in that city. They need to explain how policies, technologies, and cultural differences in other countries have helped grow and implement these sustainable efforts.

The addition of these projects improved the course by giving direction and context from what they were learning and seeing in Brazil and applying this knowledge to the US. The improvements in the course were designed to give the engineers and non-engineers the ability to be on the same academic field and to learn from each other. By incorporating wiki pages to demonstrate their research and knowledge to the class, as well as presentations to the rest of the class, allowed the students to show and teach what they learned. Peer assessments were also incorporated to help students evaluate each other and have their input incorporated into the class discussions. Students' comments about the course:

*"From our presentations in class I got to learn about lesser known energies such as geothermal, hydrogen fuel cells, and batteries. Brazil incorporates renewable energies and energy saving techniques into everyday life and the US can look to Brazil as a model."*

*"Brazil was the perfect place to learn about alternative energies. As an emerging country, Brazil saw how much the 70s gas crisis affected countries around the world and they immediately invested heavily into alternative energies. Most of the country is powered by hydroelectric but ethanol is also a major product that they produce because of the abundance of sugar cane."*

Culture Course and Immersion

**First Time Taught**

The culture course was taught by a Brazilian professor who was hired by the study abroad company. There was little given about what the professor was going to teach as there was no syllabus or outline given before the program started. The course consisted of randomized lectures on Brazilian music, politics, and movies. Though informative, there was very little structure to the lecture part of the course. There were many cultural excursions that were incorporated into the culture course that were fun and informative for the students. These excursions included a soccer game, the Afro- Brasileiro Museum, Pinacoteca Museum, a Samba lesson, a history lesson in Independence Park, Mercadão fruit market, Museu do Futebol, Capoeira instruction class, and a visit to the Latin American Museum. These excursions gave an insight on some aspects of the Brazilian culture but lacked the importance of these activites on Brazilian history. An example of this lack of historical context was when the students were not taught the history of Capoeira before learning how to practice it.

In addition, the students were asked to keep a blog during their time on the dialogue. They were prompted to answer questions to reflect on their experiences in Brazil and the digest what they saw in Brazil and how that is different from the US. This helped the students reflect and contimplate what may be different between their culture and Brazilian culture.

The only language lesson they received was on the first day of orientation in Brazil. The students commented in the evaluations after the program saying:

*"I wish I was able to speak more Portuguese while in Brazil. I felt like I missed out on some opportunties to meet Brazilians because I could not speak the language."*

The lack of knowledge of portuguese and brazilian history were aspects of the program that was missing. The lack of portuguese language knowledge hindered the students immersion into the culture as they felt uncomfortable venturing out because they could not speak the language. Also, knowing more of the historial background of Brazil would have been helpful for the students to get a better cultural perspective and allow for better immersion into the current atmosphere of Brazil.

**Improvements and Second Time Taught**

A syllabus with a schedule of daily activities was an improvement made to the second iteration of this Brazilian culture course. The course description was:

*This course provides an interdisciplinary and critical examination of the Brazilian culture. The course is designed for students who will participate in an educational trip to Brazil. The course examines major historical events from the colonial, imperial, and national periods, and their "legacies" or influences on current socio-economic, political, and cultural aspects of the Brazilian society. To better prepare the students for the in-country study, survival language skills will be offered in the course.*

Homework assignments were added in addition to the blog posts. They were given a final project in groups to make a 10 minute video that will be based on a research topic related to Brazilian culture, and/or history of a place we visited during the in-country study program. A research

paper was also given to highlight their research topic presented in the video. This allowed the students to learn more about the history of Brazil and put the differences in culture into context.

10 hours of Portuguese language lessons were also incorporated into the dialogue. This was to help the students feel more comfortable in Brazil and to allow for more immersion into the culture. This can be seen from some of the students' comments after the program ended.

*"One of the things I'll miss most is speaking Portuguese. Although it was often frustrating because I could only speak 30 words of it, it kept me sharp to understand and respond to Brazilians. We also met a lot of cool people and English was often a conversation starter."*

*"I grew from this experience by speaking to Brazilians about their country and their lifestyle. I am happy I was able to get their insight into their lives."*

While on the program, students were asked to make and write blog posts at least twice a week documenting their experience and observations on the program. Questions or prompts were given to the students to reflect on what they were feeling and observing in the country. Below is a sample of some of the questions asked of the students to blog about.

- This is your initial blog post before arriving in Brazil about what your expectations are of Brazil and being immersed in another culture. Comment on:
    - Your expectations of Brazilian culture
    - How do you think it will feel like being in another country when you do not know the customs or the language?
    - What will it be like to immerse yourself in another culture?
    - What will you do to learn about the other culture and experience it?
- While you walk around Sao Paulo, what do you notice about the environment and culture? Recycling, transportation, trash, gasoline stations, ect. Write 500 words and include pictures of what seems to be different in Brazilian from culture from our own that contributes to their ecological footprint. You can comment on housing, consumables, food, transportation, water usage, plants, etc.
- Post pictures and discuss the socio-economic differences you have seen in Brazil. What does it suggest from the differences in the social classes in Brazil?

The final blog assignment was a reflection of their time in Brazil. They are asked to comment and reflect on what they experienced and learned in Brazil. Reflect on how the Brazilian way of life was more sustainable than theirs in the USA in consumption of things and energy. They are asked to reflect on what they learned about Brazilian culture and how it differs from theirs. What surprised them about Brazil that they didn't know about before they went there for the program? They were asked to comment on how they grew from this experience and what they learned about themselves while on the trip. Students' comments from these reflections are below.

*"I know I've become a more mature and optimistic person on this trip, having to be more independent and responsible than anything else in my life has required of me"*

*"The past few weeks in Brazil have given me the opportunity to learn and grow as a person. When thinking of all of my past travels I feel that this dialogue has given me the most space, level of comfort and opportunity to grow. "*

*"The most grounding thing I took in from Brazil was the extraordinary wealth and privilege that I and most of my friends are used to. Of course, I go to an expensive school so I am surrounded by kids with more well-off families but even the people I know who are from lower income families live better than the average person in Sao Paulo. We are used to getting what we want when we want and using unlimited resources when other places don't even think about this kind of indulgence. It's very important to remember that others aren't as privileged as I am and that just because I can do something, doesn't mean I should."*

Overall Lessons Learned

After developing and teaching this faculty-led program twice, there were a number of lessons learned that can help other faculty looking to develop a similar cultural-exchange program. These topics include dealing with course pitfalls, expectations of the students, language barriers, and student reflections.

What was found from running this program the first time, was that it can be difficult to develop a course that satisfies upper classman engineers and lower classman non-engineers. It may be hard to do a lecture type course with students of diverse background knowledge. A way to overcome this obstacle is to turn the course into a project-based learning course. This entails the students working in teams to research and design on the course topic and allows each student to play on their strengths and weaknesses of their background knowledge and teach each other what the other may know. Having the students present the research they found allows them also teach the rest of the class their new knowledge on the course topic.

Understanding student expectations was also a key to student satisfaction of the program. Though this may be difficult when running the program the first time, one tip is interviewing the students individually before going on the trip. Asking questions like what do you expect the country to be like and how to you think people there live. These questions help the students realize they may not know much about the country and will prompt them to do some research before they go. Also being upfront about what the conditions are like and what they should be prepared for also helps. If you do not know this information and are working with a study abroad company, maybe they can provide some literature on what to expect in the country. Be sure to have any rules or regulations stated before your arrival to the country. Many universities have a list of rules that the students need to abide by for the university, usually in a student handbook. Make sure to refer to these and add to them. For this program, a set of rules were made which included an alcohol policy, a mandatory attendance policy, and a curfew which the students had to agree to and sign before leaving for the trip. This allowed for the students to take the program and their safety more seriously when they were in country.

It may be hard to deal with language barriers while abroad, especially for the students. If they do not feel comfortable with their surroundings, they will not interact or venture out into the community which could hinder their immersion. It was found from this program that by

incorporating even just a few hours of language classes a week the students felt more comfortable and therefore more independent to order food, ask questions, and interact with their surroundings. This allowed for more immersion into the culture and a richer learning experience.

## Conclusion

It was found that students became more globally aware and became global citizens after attending this program than they were before the program. The evidence of this came for the blog posts they were asked to keep while on the program. Also, the improvements made to this program allowed students to gain a deeper understanding of alternative energy technologies and Brazilian language and culture, which in turn allowed for deeper global competence. By changing and design the alternative energy course into a project base course, it allowed for the engineers and non-engineers to learn and teach each other in an open, communicative environment. The incorporation of language lessons was helpful for global competency and immersion of the students because if they are not comfortable with their surroundings, they will not interact with the community which could hinder their immersion. Through student evaluations, it was found that by incorporating a few hours of language classes a week the students felt more comfortable and independent to order food, ask questions, and interact with the culture around them. The addition of blog posts prompted students to reflect and internalize the experience, which helped them understand their role in a global context. Also, understanding student expectations by having a high level of communication with the students about what to expect on the program was crucial to student satisfaction.


1. Institute of International Education, "Open Doors Data: U.S. Study Abroad", *The 2013 Open Doors Report on International Educational Exchange*, 2014. [Online] Available: http://www.iie.org/Research-and-Publications/Open-Doors/Data/US-Study-Abroad
2. T. R. Williams, "Exploring the Impact of Study Abroad on Students' Intercultural Communication Skills: Adaptability and Sensitivity," *Journal of Studies in International Education*, vol. 9, no. 4, pp. 356-371, 2005.
3. Lisa Chieffo, Lesa Griffiths, "Large-Scale Assessment of Student Attitudes after a Short-Term Study Abroad Program**"***Frontiers: The Interdisciplinary Journal of Study Abroad*, vol. 10, p165-177, 2004.
4. Jack R. Lohmann , Howard A. Rollins & J. Joseph Hoey, "Defining, developing and assessing global competence in engineers," *European Journal of Engineering Education*, vol. 31, no. 01,pp. 119-131, 2006.
5. Alan Parkinson, "Engineering Study Abroad Programs: Formats, Challenges, Best Practices," *Online Journal for Global Engineering Education*: vol. 2, iss. 2, article 2, 2007.
6. David DiBiasio, Natalie A. Mello, "Multi-Level Assessment of Program Outcomes: Assessing a Nontraditional Study Abroad Program in the Engineering Disciplines" *Frontiers: The Interdisciplinary Journal of Study Abroad*, vol.10, p237-252, 2004.