Cross-cultural Collaboration Inspired by a Sustainable Building Course in Costa Rica

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Abstract

Developing successful study abroad programs challenges many higher education institutions. One particular aspect is the development of strong partnerships with institutions hosting the students. This paper provides a discussion of some of the main challenges and lessons learned from a successful partnership between two international universities that have created a study abroad program focusing on sustainable building practices with the aim to prepare students for global sustainability challenges. The program incorporates lectures, guest speakers, field trips, students' presentations, as well as individual and group activities. Also, students have a 2-night-stay with local families and participate in a service-learning project, all of which impact student thinking, cultural awareness, and social connectivity. Having these multiple learning activities posed challenges in the organization and execution of the program. However, students have developed critical skills to communicate with others from different backgrounds. The significance of this paper is to provide lessons learned to help others better understand the challenges of developing a successful partnership among international universities.

Introduction

Globalization is having a significant impact on engineering and construction education. The United Nations Sustainable Development Goals (SDGs) put forward that professionals such as engineers need to have not only technical skills in their fields but also have professional skills applied outside of their native context and culture [1]. One of the challenges to developing these skills, it is the shortage of future engineers being trained worldwide [2]. Bourn & Neal [3] also discuss that students who do graduate are often not prepared with the skills needed to work in international context. Particularly, professional skills such as communication and cultural and global adaptability enable future professionals to work on transnational teams.

Working effectively with multicultural teams is becoming more relevant. While it is clear that engineering and construction education has made some change to preparing future professionals for working in these complex teams, much more progress toward preparing students as holistic professionals is needed [4] to work in an increasingly globalized economies. Students must be taught in such a way that develops not just technical skills, such as math, but also professional skills, such as creativity and reflection. The National Academy of Engineering suggests that significant opportunities will exist if educational programs can provide learning experiences that help students to operate in a global environment [5].

Previously, several Colorado State University (CSU) faculty performed research in collaboration with University of Costa Rica, to document the challenges and positive impacts of integrating service-learning into a travel-abroad program focused on sustainable construction [6]. Notably, their research and first-hand experience showed that in such a program, service-learning activities encourage exchange and appreciation of cross-cultural similarities, as well as differences, and deepen's student motivation to learn and engage. In particular, observations included that having many small low-tech projects as part of the service-learning activity aids in

workflow, motivation, productivity and team building. In addition, the authors indicate that having an inter-disciplinary class structure helps to mitigate some of the logistical and cultural challenges typical to implementing service-learning projects since a range of skills are needed on-site [6]. Although many similarities exist between the two programs, and, specifically, between course level student learning objectives, the main difference between offerings were tied to the logistics of the programs. The earlier version of the study abroad program included significant travel over the ten day period, with students relocating approximately four times to different locations around the western region of Costa Rica. As such, one of the objectives of the service-learning activity was to promote and foster bonds within the multi-national student group as well as to address the needs of the local community. The subsequent program offering, as described in this paper, is primarily a residential program where students are housed at a University in the eastern region of Costa Rica. As such, the main objectives of the service-learning activity as currently performed are more focused on establishing bonds between individual students and the surrounding community in order to address local need and sustainability.

This paper introduces a subsequent study-abroad program in Costa Rica, which focuses on Sustainable Building Practices. From 2013-2017, Colorado State University (CSU) and EARTH University formed a partnership to host a 12-day travel study program. CSU had originally offered the program in the Caribbean in 2009; the following year it was offered in partnership with the University of Costa Rica. Most recently, the latest iteration of the course is based on a new partnership with EARTH University. This paper provides context about the organizational challenges and lessons learned from this partnership. First, this paper describes a brief overview of the study abroad program including the content, structure, and assignments. Second, the paper provides a discussion of the challenges related to planning and executing this course. Finally, lessons learned by the faculty leaders and support staff provide insights about what to expect when developing such programs.

Program Content

Development of the study abroad program involved internationally known faculty and professionals in the field of civil engineering, architecture, and construction management from countries such as United States, Panama, and Serbia. The program also involved professionals with backgrounds in engineering, architecture, agriculture, and community development from Costa Rica. The program teaches CSU and EARTH students with typically 6-8 nationalities and diverse perspectives represented. The program is based in several locations in Costa Rica, which is world renowned for its extreme range of biodiversity as well as providing a dramatic and effective experiential setting to learn about climate-adaptive building practices.

The program objectives include to:

- Define concepts of sustainability and climate adaptive design and construction
- Build a cross-disciplinary, cross-cultural, learning environment through student diversity, teamwork, and interdisciplinary project work
- Complete a sustainably oriented service experience
- Apply concepts related to human centered design and sustainability in a tropical climate through an authentic community-based project

The program is a 3-credit hour elective for the U.S. students, and they are required to apply and then register for a course using a formal application process managed by the Office of International Programs (OIP) at CSU. Students from EARTH University receive certification upon completion of the course and they submit their application to the OIP at EARTH University. Faculty leaders review the applications and provide recommendations for students' acceptance to the program. Of note, the faculty members offer the course at the beginning of the calendar year, prior to the start of spring semester for students in the United States, and during summer break for Costa Rican students. This timing provides students the opportunity to attend the travel course, without a full semester or summer academic commitment.

The selected CSU students have several pre-trip meetings in the U.S. related to safety, health, and cultural awareness, as well as team building exercises. During these meetings, the faculty leaders in conjunction with OIP advisers discuss key topics to help students prepare for their study abroad experience. In addition, there are discussion and guidelines about the course agenda and assignments. The on-site program in Costa Rica incorporates lectures, guest speakers, field trips, multi-media, student presentations, discussions, as well as individual and group activities. The faculty members conduct these learning activities in a variety of outdoor and indoor settings – e.g., LEED-certified buildings, conference rooms, farms, beaches, computer labs, and restaurants. Students also learn about sustainability through staying with host families, cross-cultural interactions with EARTH students, and completing a service-learning project with the local community.

For the past four years, the faculty members taught and facilitated the course with a similar pedagogical approach. Students are required to complete pre-trip assignments prior to the program and on-site assignments during the 12-day program. Major assignments are described below.

Pre-trip Assignments

- Sustainable Case Study: Each student has to identify a project (building, construction process, or land development) with clearly articulated sustainable features and develop a two-page write-up of a project description. Students submit their case study reports prior leaving for the program abroad and then present the case studies during the actual course. When students present their case studies, they must be prepared to address the sustainable features of the project such as sustainable site, water efficiency, material and resources, energy efficiency, etc.
- Eco-Footprint: Prior to arriving on-site, all students have to prepare and calculate their personal eco-footprint based on their current location (either Costa Rica or the United States). They bring the results to class and as a group, analyze the pros and cons of the different options and how they might contribute to minimizing their eco-footprint.
- Readings: students are responsible for reading the IDEO's Human Centered Design toolkit and becoming familiar with the Holcim Awards for Sustainable Construction Target Issues. The first reading is primarily used to learn about different strategies to gather information from the community. The second reading is used for the final project in which students work in groups of four and mimic the submission to the Holcim student competition.

On-site Assignments

- Community need assessment: Students stay with host families for two nights to learn about culture and life in Costa Rica. Together they discuss community needs and viable projects for the community. The students revisit the need assessment during the last two days of the course where students work on a final group project. Host families typically do not speak English and, therefore, students are partnered with a Spanish-speaking student who can translate for them as needed. Sometimes American students have basic knowledge of the language, so they practice their language skills with their host families.
- Service-learning project: Students also participate in service-learning projects (e.g. overlook shelter, restrooms, or walls) for one day. These projects help them to learn about teamwork, project management, local materials, and sustainability. Most of these projects have implemented the use of bahareque, which is a natural construction technique using bamboo, wood and clay. The students and faculty interact with community members and local designers/builders, understanding the challenges and benefits of working with communities. Students need to share knowledge across cultures, which is critical to complete these projects.
- Final Group Project: the faculty members mindfully form student groups, which represent a variety of cultures, genders, educational backgrounds, and experiences. The program leadership expects students to apply integrated design practices and to work together collaboratively. The goal of the project is to apply lessons-learned in the course to a real-world situation based on the need assessment that students conduct when staying with their host families and the community. Project deliverables include project goals, conceptual solution, 3D schematics using SketchUp software, and estimate of resources to build the proposed solution.
- Individual Reflections: Student journals serve as a working record of course materials and activities. The reflection serves as a reference and benchmark to support future evolution of student critical thinking, goal setting, and career exploration related to sustainability. At the minimum, the journal must have seven reflections. Typically required topics include a personal definition of sustainability, five reflections discussing topics or observations learned during course, and a final reflection on group project commenting on the integrated design process and team dynamics.
- Personal Mission Statement: Students fill out a short questionnaire and write a vision outlining, “What am I going to do with the information of this course.” Faculty share with them the vision from Limits to Growth: The 30-year Update (Meadows et. al, 2002) so students can create their own vision.

Overall, content delivery during the program uses a combination of live lectures or presentations and practical, hands-on activities and experiences. In addition, guest speakers from industry and academia lecture on relevant topics like global wood construction, certification process, life-cycle assessment, and local construction techniques. Other learning opportunities included site visits to local sustainable farms and LEED certified projects. As described above, students are not only learning a critical body of knowledge related to sustainable design and construction practices, but are also encouraged to develop an appreciation for designing and building projects in a multinational, multicultural, and multilingual environment.

Previous Participants

In the last four offering of this program, a total of 66 students have enrolled in the course in which their background has added diversity not only in terms of gender and major, but also their cultural origin comprised of U.S. American, Latin American, African, and other descendants as shown in Table 1. The study abroad program is co-taught and co-attended by professors and students from several countries. Participants to date include students from Colombia, Costa Rica, Ecuador, Ethiopia, Guatemala, Kenya, Malawi, Rwanda, Sweden, Uganda, and the United States. The students have represented majors in several disciplines including construction management, engineering, business, interior design, landscape architecture, agriculture sciences, and natural resources management.

Table 1: Participant Demographics by Gender, Nationality, and Major.

Year	***2014***		***2015***		***2016***		***2017***		***Total***
	Female	Male	Female	Male	Female	Male	Female	Male	
Gender	6	11	6	10	8	10	4	11	66
Country/Region									
U.S.	4	8	4	8	6	8	2	9	49
Latin America (Colombia, Costa Rica, Ecuador, and Guatemala)	1	1		1	2	1	1	1	8
Africa (Ethiopia, Kenya, Malawi, Rwanda, and Uganda)	1	2	1	1		1	1	1	8
Europe (Sweden)			1						1
Major									
Construction Management and Civil Engineering	2	8	2	7	4	7	1	9	40
Agriculture Science	2	3	2	2	2	2	2	2	17
Other (Business, Interior Design, and Landscape Architecture)	2		2	1	2	1	1		9
Faculty leaders and TA*	2	1		3	2	1	2	1	12

**** Excluded from above demographics.***

The combination of backgrounds of these students provides an unparalleled, multi-disciplinary, and cross-cultural student-travel experience. CSU student reflections consistently identify international student interaction as one of the biggest benefits, with cross-cultural discussions of sustainability as the most valuable learning component. The lead faculty members believe that such cross-cultural experience also mitigates the challenges of implementing service learning in remote locations, including project logistics, health and safety of participants, and developing local trust and rapport.

Planning and Logistics Challenges

While there have been challenges associated with the planning, development, and execution of this program, to date they have largely served as an opportunity for faculty leaders and support personnel to identify future enhancements of the program. Developing a study abroad program with international universities requires a significant amount of planning and logistics. These additional responsibilities include: identifying partnership opportunities with counterpart institution, conducting effective planning meetings, determining appropriate content, securing enough funding to visit the site ahead of time, addressing different program expectations, adapting to different semester schedules, preparing content that can be communicated to various disciplines, and identifying health/safety challenges. Based on program leaders' self-assessment, students' perceptions, and course surveys, the challenges from the leadership program's perspective are briefly discussed.

Identifying the partnership was facilitated by the OIP at CSU, which provided financial support for faculty and support staff to visit several universities in Costa Rica to see if the institutions would be able to align with the main goals of the program. In 2013, the OIP solicited partnership and support bids from several institutions including Universidad de Costa Rica, EARTH University and Universidad Latina. Each institution had something special to offer, but a site visit showed that EARTH University was the most eager and well-connected collaborator concerning sustainable education.

Creating such a program required funding from real and in-kind sources. Funding for the initial planning trip to the host country was supported by a combination of internal funds at CSU from OIP and logistical support from EARTH University. The annual program expenses are covered by student fees with typically 10 students required to balance the program expenses, including faculty travel costs. As shown in Table 1, every year we have more than 10 students, so the program has been financially successful. The enrollment and budget provide travel costs for two faculty, and nearly $10,000 in salary for the faculty members to split. The program fees also cover payment to the host institution for transportation, housing, food, and resources for a service learning project. In some years, CSU has been able to sponsor travel costs for the EARTH students to be part of the course. In-kind resources are also provided by the Construction Management Department at CSU, the host community members, and the local guest speakers, who are eager to teach local concepts and organize site visits for the students.

Since the program has incorporated a multiple learning activities and travel to various locations in Costa Rica, it is difficult to increase the number of participants. The faculty concluded that the optimal number of participants would be around 12 to 15 students from CSU and 4 to 5 from

EARTH University. This lack of scalability has impact on how many students could benefit from such rich experiences. Previous participants have served as key recruiters for future offerings minimizing the pressure on the faculty and staff to find last minute applicants. In addition, the program structure requires early applications deadlines so that students can benefit from pre-trip assignments and planning for their travel experience. During our interaction with students faculty discovered obstacles to participate in the program such as funding, having winter internships, and fears about delaying graduation.

Planning meetings between EARTH University and CSU were conducted initially over the phone or Skype. Then, during the arrival to Costa Rica, face-to-face daily meetings with the on-site staff were required to discuss any schedule changes. During the various offerings, documenting lessons learned from previous offering, made planning for each new winter program easier. The group leaders observed a significant communication challenge related to scheduling the service learning project during the initial planning phase. This scheduling has been something that both institutions recognized and dealt with by discussing the needs of the communities and groups. In some cases, projects have been reduced in scope to make sure that all the students can actively participate and take different roles during the execution of the projects.

While the course is offered during the winter break at CSU, varying semester schedules made it challenging to coordinate the start date of the program. Sometimes, students and faculty will be required to travel during holidays, so the course can finish before the regular semester. In addition, EARTH students typically will have to overlap their regular semester classes during the last two days of the program. In addition, most of the industries and institutions in Costa Rica are on vacation during the last two weeks of the calendar year. Therefore, it can become difficult to contact local partners to adjust any final schedule until the faculty leaders are in the host country.

For many students, this program may be the first time they were immersed in multi-cultural and multidisciplinary settings. It became clear that providing an orientation to understanding other cultures was necessary. To do so, one of the main pre-trip meetings focused on cultural awareness; faculty leaders along with members of the OIP develop material for students to understand the idiosyncrasy of the Costa Rican culture, and to be aware of how Americans might be perceived abroad.

Lessons Learned

Several recommendations have been implemented to improve the program with each offering. The lessons are described for those faculty leaders implementing similar programs with diverse group of students and a range of teaching activities. The lessons learned described below are also based on program leaders' self-assessment, students' perceptions, and course surveys. These lessons learned can be organized as follows: effective communication with learners, building rapport, opportunities for faculty, and creating emergency protocols.

- Faculty recognized that when learners have a different cultural background from the teacher or other students, it is important to set clear expectations about assignments, classroom interactions, and group learning experiences. For instance, in a class with

students who have diverse cultural backgrounds and a variety of life experiences, the faculty need to communicate the expectations for participation in course-related discussions or other activities. For example, it may be important to reassure that the focus for discussion is more on course content issues than perfect grammar and syntax for non-native English speakers.

- In addition, faculty leaders discovered that team bonding is valuable before arriving into the host country, particularly when students from several disciplines are part of the course and they might not be familiar with each other. Thus, the program in year two implemented team-building exercises for CSU students before arriving to Costa Rica to minimize anxiety and build team rapport before and during the program.

- Faculty members leading these type of programs know the experience is exhilarating but also a lot of hard work. The hours often extend from early in the morning to late at night. There is an extra pressure to double check that everything will be running according to the plan plus being responsible for students 24/7, and the hassle of coordinating accommodations, restaurants, buses, and field trips. Faculty who are willing to do this should be compensated financially or have this as part of their teaching load. They should be allowed and encouraged to take their families, if they so desire. They should also be recognized and rewarded during tenure and promotion process as argued by Parkinson [7].

- Finally, the demands of this program such as minor health incidents and accidents challenge the time and energy of the support staff in both universities. For example, the staff has developed protocols to deal with passport losses, academic misconduct, and health related accidents. Two of the faculty leaders have been trained in Global Health Advanced First Aid. This training has been fundamental to better handle a variety of situations ranging from crisis management (safety issues, natural disasters) to student health and disciplinary problems.

The above discussion presents specific aspects of learning and organization based on one short-term study abroad program. While some of the readers might see it as a limitation, the authors believe that lessons learned contribute to those institutions and faculty leaders trying to develop similar programs and global citizens. Also, it is important to acknowledge that this paper does not discuss the achievement of learning outcomes during the program since this scope is part of another paper.

Conclusions

Overall, the 3-credit study-abroad program has provided an opportunity for the students to create a personal definition and agenda encompassing sustainable practices, culminating in a team project incorporating sustainable design and development solutions, which are framed around such concepts as Human Centered Design and Integrated Project Delivery. The significance of this paper is to serve as a model case study presenting lessons learned from the leaders of the program to help others developing study-abroad programs to better understand the challenges of building a successful partnership among international universities.

Future research should look at other short study abroad programs and investigate how they facilitate the development of professional skills across cultures. We encourage other researchers to continue to explore which pedagogies are most powerful depending on the course offering and learning environment. Finally, specific approaches to help overcome the challenges of forming a successful partnership between international universities needs further investigation. In addition, the authors will look at identifying key factors that prepare students to become global citizens and at assessing long-term impacts of being part of this program based on this programmatic structure.

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