Engineering Faculty Perspectives on Shared Global Experiences

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Abstract

Studying overseas has a deep and profound impact on the intellectual and personal development of faculty and students. This paper provides an overview of a Global Explorer Program (GEP) and a case study of an American born female transportation engineering professor who taught overseas in the United Kingdom/France and Egypt/Jordan. This professor developed new courses for these programs to heighten the students’ experiences in transportation engineering while abroad. International transportation concepts and examples impacted the courses and curriculum. Outside the classroom, the faculty and students shared real-world learning experiences by observing and questioning together differences in the traffic control, safety and operations on roads in other countries compared to the US. These experiences shaped faculty and students cultural and historical perspectives, and exposed them to civil engineering practices in other countries. This allowed the faculty to be a more effective teacher through experiences gained overseas and civil engineering design examples that can be shared in the classroom to heighten the global awareness of civil engineering students both technically and culturally.

1. Introduction

Studying overseas has a deep and profound impact on the intellectual development of faculty and students and help them become better aware of other cultures and environments. International experiences are needed in today’s society to shape the lives of engineering students, and prepare them for a world that is increasingly moving toward a global marketplace, especially in the civil engineering and construction industries. “Most engineers at some point in their careers will work with colleagues in foreign countries, either as co-workers, customers, or suppliers. Study abroad programs are powerful tools for training students and faculty in cross-cultural communication”\(^1\).

The importance of preparing engineering students to deal with ever-increasing globalization has been well-documented by engineering societies and accrediting agencies\(^2,3\). As per an American Society of Civil Engineers (ASCE) publication, global education should also emphasize “ways to prosper within an integrated international environment; and meet challenges that cross cultural, language, legal and political boundaries while respecting critical cultural constraints and differences”\(^2\). The Accreditation Board for Engineering and Technology (ABET) outcome h calls for engineers to have a “broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context”\(^3\).

Global engineering education is needed so that graduates are not only competitive with those of other nations around the world, but so that engineers from various countries can work together towards addressing our worldwide challenges related to infrastructure, especially in developing countries. Such challenges include access to clean water, adequate sanitary facilities, drainage systems and viable transportation systems, which are lacking in 30 to 60 percent of the urban population in developing countries\(^4\). Faculty development and knowledge of international engineering designs is instrumental in shaping students global perspective in classrooms on campus and abroad.
There is a world full of vibrant cultures, rich history and splendid possibilities waiting to be discovered. Our Global Explorer Program provides a unique bridge into the human spirit, understanding and tolerance. The veil of ignorance and accepted barriers that separate us should not conceal the love we all share for the arts, music, literature, monumental architecture, and common humanity. Our department remains the daring pioneer to explore new frontiers to enrich and develop its students.

2. Global Explorer Program

The Global Explorer Program (GEP) was established in the Department of Civil Engineering and Construction (CEC) at Bradley University in 1996 by Dr. Amir Al-Khafaji to permit students to study in different countries, permit faculty and student exchanges, and develop scholarly collaborations with other institutions. In this program, several courses are taught by CEC faculty members in an accelerated manner, while students and faculty gain international exposure together. Participating students enroll in only one course during the January interim semester while abroad, and upon completion of the program are considered Global scholars. Through Bradley’s CEC department GEP, faculty and students have traveled to the following countries: Egypt, Jordan, United Kingdom (UK), France, Denmark, Norway, Sweden and Malta. Each time the program is offered, 30 to 40 students visit these countries to study courses taught by three to four CEC faculty with guest lecturers from Universities and government agencies abroad. Since 1996, over 250 students have studied overseas. The GEP was designed to expand the professional capabilities, stimulate intellectual growth, and broaden personal perspectives of students and faculty that participate in the program. Figure 1 describes the various possibilities to available to our students and faculty.

![Figure 1. The CEC Global Explorer Program at Bradley University](image)

The focus of this paper is on two specific GEPs to (1) United Kingdom and an excursion to France, and (2) Egypt, including a visit to Jordan. In the two to three week GEP abroad, classes are held nearly every day, from 7:00 am to 11:00 am, with daily field trips made via charter
buses to historical sites across the regions. For lodging, our Bradley students mostly stay in dorms of partnering universities to heighten their cultural experiences and interact with the local college students. Bradley’s CEC GEP differs from programs offered by other universities in that students studying abroad get exposure to entire regions within different countries, and not just traveling to one major foreign city. Figure 2 illustrates the regional areas covered in the United Kingdom/France and Egypt/Jordan GEPs.

As a part of the United Kingdom/France GEP, students and faculty stayed at the dorms of the University of Wolverhampton, which is located in the central region of the United Kingdom. The global explorers then traveled to London, and afterwards headed to Paris, France making this trip via the Chunnel, a train traveling through a tunnel underneath the English Channel. These facilitated daily excursions to real world environments in the United Kingdom and France as listed below.

- Wales – reclamation of the canals.
- Iron Bridge – the first iron arch bridge in the world.
- Stonehenge – mysterious feat of ancient engineering and design (Figure 3).
- Stratford upon Avon – Shakespeare’s birthplace with many traffic calming devices.
- London – The British Museum, the Tower Bridge, the Tower of London, Windsor Castle, Buckingham Palace, Big Ben, Houses of Parliament, London Eye, etc.
- Paris, France - Eiffel Tower (Figure 3), Notre Dame Cathedral, Louvre Museum, Champs-Élysées, Arc de Triomphe.
- Versailles, France – The Palace of Versailles and Versailles Gardens.

Figure 2. Locations Visited United Kingdom/France GEP and Egypt/Jordan GEP
The overall structure and organization of the Egypt/Jordan GEP was similar, however the cultural differences in this region were vastly different as compared to the United Kingdom/France program. In the Egypt/Jordan program, again while teaching/taking a three credit hour course in civil engineering, students and faculty visited the historical sites listed below.

- Amman – capital and most populous city of the Kingdom of Jordan. The Advisor to the King of Jordan spoke to our students (Figure 4).
- Petra – historical and archaeological city in southern Jordan.
- Wadi Rum – valley cut into the sandstone and granite rock in southern Jordan. GEP travelers stay in desert camps and experience the native Bedouin style of living.
- Aqaba – is a Jordanian coastal city situated at the northeastern tip of the Red Sea.
- Dead Sea – is the deepest hypersaline lake in the world.
- Cairo – America University of Cairo (AUC), Cairo Tower, Dinner cruise on the Nile River, Khan Khalili Market, Salah Al Din Citadel.
- Saqqara – home to vast ancient burial grounds and Step Pyramid of Djoser.
- Giza – home the Great Pyramids (Figure 4), and the Great Sphinx.
- Luxor – Valley of the Kings, Valley of the Queens, Open air museums of Karnak.
- Memphis – home to ruins of ancient Memphis and sculptures of Pharaoh Ramses II.
- Alexandria – Library, Roman Amphitheatre, Roman ruins, Qaitbay Citadel.
- Suez Canal and Red Sea - connecting the Mediterranean Sea and the Red Sea.
Beyond just traveling and learning in foreign countries, the GEP challenged both students’ and faculty’ abilities to meet deadlines, and manage time effectively while immersed in a variety of different cultures. Industry partners with Bradley’s CEC Department value the GEP and seek to employ graduates who are global scholars. “Young professionals who understand the dynamics of global economy and intercultural relations have an advantage in finding jobs with companies doing business in the global environment”\(^5\). These partners demonstrate their commitment to the program and the importance of these global experiences by providing financial assistance, approximately $12,000 each time the program is offered, to offset the cost for students with financial hardship, allowing them to participate in the GEP. In today’s global market and economy, employers prefer employees that have experience not only going abroad, but dealing with deadlines, pressure, personal time management skills that are faced during the GEP, while being amongst and interacting with people of different cultures, speaking different languages and having different political and religious views than their own. “Cultural competency can prove invaluable when working on global business teams or negotiating with overseas clients”\(^6\).

The CEC GEP has far-reaching benefits beyond influencing the perspectives of students that study abroad. Faculty that teach overseas in this program are shaped by cultural and historical perspectives, and through exposure to civil engineering design in other countries. This allows faculty to be more effective teachers, because now they have hands-on overseas experiences and civil engineering design examples that can be shared in the campus classroom setting to heighten the global awareness of CE students. The next sections present a case study, specific faculty development opportunities, and personal experiences gained through the GEP.

3. Faculty Professional Development Through the Global Explorer Program

Throughout her academic pursuits and career, Dr. Schattler, an American born female transportation engineering professor, interacted with students and colleagues of many different ethnic backgrounds. Although she had an appreciation and understanding of different cultures, it was limited because her own personal experience with being a minority in a foreign country was limited. Additionally, she sought to expand her knowledge of global transportation engineering concepts and designs so that she would be better equipped in the classroom to teach such topics.

After joining the CEC Department in 2005, she grew fond of the GEP and sought to enrich her background as a teacher, scholar and personally by participating in the study abroad program in 2008 to United Kingdom/France and then again in 2011 to Egypt/Jordan, both of which were led by Dr. Al-Khafaji. In both of these programs, she developed and taught new courses previously not offered on campus in order to heighten the learning experience for the students.

For the United Kingdom/France GEP, a three credit hour course, CE 492: Assessment of International Transportation Systems, was developed and taught, which included the following topics: Transportation systems and modes; Transportation system issues and challenges; Roadway safety management including case studies form Sweden, Germany, the Netherlands and the United Kingdom; Transportation planning and policies; Intelligent Transportation Systems with applications from the US and Japan; Public Private Partnerships, Engineering economics; Transit operations/Mass transit systems with comparisons of systems in the US and UK; Airport design and operations; and Transportation Security. For the latter topic, guest
lecturer Professor Chris Nwagboso, from the Midlands Institute of Transport at the University of Wolverhampton presented *Integrated Transportation Security – Vision of the Future* to our students. Additionally, Mr. Luke Walker, IWA Restoration Committee member and Vice Chair of the Wilts & Berks Canal Trust spoke to our students on *UK Inland Waterways – from Rivers to Navigations*.

Outside of the classroom, the learning and experiences gained proved even more challenges both intellectually and personally. Faculty and students together questioned and were challenged by UK drivers traveling on the opposite side of the road compared to other nations around the world, who also travel in much smaller vehicles and through narrow lanes. As pedestrians crossing roads, additional cautions had to be taken to ensure safety. Americans are used to checking for traffic from the left first and then the right, however when the directions of vehicle travel are reversed, pedestrian tourists must reverse their habits. Other intriguing systems included London’s mass transit system the Tube, the double decker buses, the UK’s commitment to pedestrian friendly roadsides, and their consistent and frequent use of roundabouts instead of traffic signals. To fulfill a term project requirement for the CE 492 course, students were instructed to identify a traffic operations and/or safety aspect that they encountered during their travels, conduct research on the topic, and prepare and make a presentation to the class on the subject. Presentations were made on traffic calming devices in the UK (puffins, pelicans, toucans, etc.), European roundabouts, driving on the left side of the road, pedestrian crossing UK vs. US, on-street parking, traffic signing in Europe with metric vs. SI, and others. Through these presentations the students would find answers to their own questions as observed in a real world European setting, and educate the entire class on their findings.

For the Egypt/Jordan GEP, CE 592: Sustainable Transportation Systems, a three credit hour course, was developed and taught and covered topics such as: Transportation Supply and Demand, Transportation Planning and Policies, Planning and Evaluation for Decision-Making, Highway Systems, Public Mass Transportation, Air Transportation and Airports, Moving Freight, Sustainable Design & Infrastructure. Students’ performance was assessed in a similar way as the UK/France course, including the term project requirement. For the term projects, students researched and presented topics on what they were observing and questioning, such as traffic and congestion in Cairo, vehicle crashes in Egypt, Transportation along the Nile, Suez Canal, Roundabouts in Cairo vs. US, U-turn lanes in Jordan and Egypt for example.

The experiences gained while overseas continue to benefit Dr. Schattler back on campus because she is more culturally sensitive, and has knowledge of other cultures that she can discuss with colleagues, students and others. As it pertains to course content, examples and discussions of the traffic related phenomenon in Egypt, Jordan, United Kingdom and France are integrated into her courses so that students on campus improve their global awareness of engineering planning and design. For example, when presenting material on modern US roundabouts, the lectures now include material on European roundabouts, their similarities and differences from a design standpoint, supplemented with photos taken while abroad. When traffic congestion issues are being discussed, US statistics and photos are presented, as well as data and photos of congestion in Cairo, Egypt.
The challenges faced with respect to traffic engineering aspects abroad, as she experienced as a pedestrian, driver and passenger still pose many unanswered questions. Dr. Schattler continues to explore these issues from a research perspective. Her future aspirations include partnering with professionals on campus and overseas to help quantify and find solutions to address some of these issues which include traffic congestion, pollution and safety in Cairo, pedestrian crossing and driver safety for tourists in UK, among others. It is not uncommon for faculty who travel abroad to conduct research to investigate their observations. For example, several studies, presented at US conferences pertain to improvements to the road to Mecca in Saudi Arabia².

Other lessons learned by Dr. Schattler through the GEPs outside the realm of engineering also continue to shape her life in profound ways. The experience of being a minority in different cultures and its difficulties has helped her relate better to international students that are new to the US. For example, as the Graduate Advisor for the CEC department, Dr. Schattler is the first engineering faculty to meet with new international students who may have only been in the US for the first time for a few days. It is easier for her to make them feel welcomed and comfortable because she has hands-on experience on what it feels like to be a foreigner in a country where everything is different. She communicates this to the new international students so that it makes them feel more at ease and comfortable because of this shared connection.

The commitment to teach abroad require faculty to make personal sacrifices, leaving their families for weeks at a time, usually during the holidays. In Dr. Schattler’s case, having made the decision to travel abroad far in advance, she was not anticipating that this trip would occur in the midst of moving to a new house with her new husband and other family medical emergencies that arose back in the US. Dealing with such personal issues long distance, coupled with the intensity of the program, balancing students’ needs inside and outside the classroom, classroom responsibilities, and acquiring advanced time management skills, while immersed in culturally challenging environments, truly provided an experience for Dr. Schattler that made her personally and professionally stronger, and a more complete person overall.

4. Summary and Conclusions

Increasing engineering students and faculty perspectives of other countries and cultures is necessary in order to address our global engineering infrastructure concerns. Two ways to accomplish this is through participation in study abroad programs, and/or by integrating international concepts and engineering designs into the classroom. The latter certainly can expose the student body at large, however faculty who are committed to internationalization, and equipped with the knowledge and experiences from a variety of different countries and cultures are needed. But how do faculty get such knowledge and design experiences to the extent that they can teach it in a meaningful way? The answer is to travel and study and teach abroad. However, faculty barriers to teach abroad have been documented in the literature and include lack of personal experience and cross-cultural competence⁸,⁹, biases or fear of different cultures¹⁰ and a lack of personal interest in global affairs⁸.

One method to overcome some of these barriers would be to develop a study abroad program that allows more than one faculty and class of students to travel abroad in a group, and make it attractive and cost effective for students to attend, such as the GEP in the CEC department at
Bradley University. These features are what attracted one American born female transportation engineering professor to participate in two GEP, in addition to her own personal desires. In terms of faculty development, Dr. Schattler learned more than she ever thought was possible during the GEPs. She continues to share her experiences while in the United Kingdom/France and Egypt/Jordan with students on campus from the freshmen level to the graduate level in several areas of civil engineering, in addition to colleagues, industrial partners, family and friends. This stresses the importance of internationalization to a vast and wide audience. If others see that a young, female American professor is not only eager and enthusiastic about her travels to Egypt, Jordan, United Kingdom and France, but also enforces international design concepts in the classroom, it increases international awareness and increases their thirst to travel abroad. Ultimately, faculty have a great responsibility and opportunity to shape students perspectives on global engineering, which is needed for sustainable infrastructure across the globe.

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