AC 2012-3468: INTERCULTURAL COMMUNICATION: A NEW COMPETENCY FOR THE GLOBAL ENGINEER

Dr. Suzanne W. Scott, The Petroleum Institute

Suzanne W. Scott is an Assistant Professor in the STEPS Program (Strategies for Team-Based Engineering Problem Solving). She holds a Ph.D. in English from the University of Denver, an M.A from Washington University, and a B.A. from Drury University. She is a former Coordinator of the EPICS (Engineering Practices Introductory Course Sequence) Program at the Colorado School of Mines under the directorship of Dr. Robert Knecht, and has served as one of the principal investigators in the PI/CSM collaboration, "Preparing Global Engineers" on both the CSM and PI campuses. Her research interests and publications focus on engineering design education in the Middle East and the U.S., intercultural communication, and educating engineers for global practice.

Intercultural Communication: A New Competency for the Global Engineer Instructional Module Introduction and Part I

Abstract

While in the past an engineer was defined almost solely by his or her technical competencies, today it is largely recognized that engineers need soft skills and other ‘non-technical’ competencies that contribute to an effective and optimal engineering design process. Written and oral communications skills, teamwork, marketing, leadership and project management skills have long been recognized as valuable traits. This paper asserts, as a result of globalization and the overall expansion of engineering industries across international borders, that there is a need for a new, non-technical competency for engineering students in *intercultural communication*. Engineering educators should include this competency in curriculum in order to educate our students as global citizens who are capable of working tactfully, graciously, and effectively in international settings.

While other educators have found bases for courses and modules that address intercultural communication for the engineer working with other engineers, this paper outlines a tactic for the development of a broader scope of awareness. Engineers don’t need to communicate just with other engineers internationally. They need to communicate with the taxi driver and the concierge; they need to know what time it is and when to be there; how their appearance and gestures are perceived, and all manner of other types of verbal and non-verbal communication beyond technical discussions. The following paper outlines a strategy for implementation of a module on intercultural communication in an engineering curriculum that is not just about engineers and engineers, but about engineers and everyone else. This module not only serves to bring awareness of outside cultures but it gets students thinking about the accuracy of perceptions of their own culture and how they would advise someone coming into their culture. Finally, while this module is largely about differences, the ultimate goal is that students identify the sameness of the human condition that binds all cultures. This realization is ultimately the bond that creates the most meaningful relationships – professional or otherwise. The paper represents the onset of a research initiative with the author’s university. It presents a completed Introduction and Part I.

Introduction: The Globalization of Engineering Education

The American Society for Engineering Education has stressed “(w)ith more companies expanding into new areas of the world, the need for engineers who are capable of working in more than one culture has increased.”¹ Whether traveling to an international location to work on an engineering project or working on an international team at their industrial base, our graduates need to have an understanding of differences in values, manners, customs, language, work ethics, and leadership that may influence successful communication in the engineering problem-solving process. It is also important for our students to have an awareness of global challenges facing engineers in the 21st century and intercultural differences that may influence communication and success in meeting those challenges.

In 2008 a group of prominent engineering educators made an urgent “call for action” to discuss the globalization of U.S. engineering education. “The Newport Declaration” recognized the rationale for and urgency of this need and made recommendations about what educators should do and could do to fill this requirement. The group expressed the need for educators to “gain greater respect for the important ‘soft skills’ associated with international work and study” and that “international experiences should be considered as fundamental as having a course in heat transfer for a mechanical engineer.”² It was generally recognized that there were initial hurdles and barriers preventing integration of global education in a “lock step” engineering curriculum and that existing programs were only in their infancy.

Since 2008 a number of educators have described ways of bringing global perspectives into engineering curriculum. G.L. Downey and J. Lucena have identified cultural differences in how engineers define and solve problems differently. “While it is now appropriate to assume that each person is a member of one culture whose boundaries coincide with those of a country, it is still critically important for students to gain educational and work experiences with people who were raised and trained in other countries and to understand dominant images and patterns of engineering work in those countries.”³ Their research has developed into a course at the Colorado School of Mines, where the emphasis is on the diverse professional experience of the engineering conversation and process and not so much on the overall intercultural experience.

M. C. Paretti, L.D. McNair, and C.B. Burgoyne studied two focus groups of students: one group given classroom instruction in intercultural communication and another that participated on an international virtual team. The first group showed gains in awareness of intercultural communication issues but worried about how their textbook knowledge would play out in a “real life” scenario. The second group tended to ignore the intercultural issues and focus on technical issues.⁴ This study would suggest that the students who had been given classroom instruction had a better level of readiness in a global setting but that both the classroom simulation and the virtual partnership had value in promoting these skills.

Many universities have been supplying global perspectives through travel experiences for years but a new emphasis in the engineering realm is creating exciting opportunities. Like Carnegie Mellon, more and more engineering universities are stressing the value of “students graduating as global citizens, equipped with the skills to innovate, communicate, and lead teams comprised of people from all over the world. Great innovators understand cultural differences and local market needs...Traveling abroad is an excellent way to enrich the academic experience and learn to work with people from different cultures.”⁵

In the same vein of tossing students out of their provincial nests into international settings are several design competitions. One in particular involving this author’s Middle Eastern university, The Petroleum Institute of Abu Dhabi (PI), and an American university, The Colorado School of Mines (CSM), brings teams of students together to compete in semester long projects culminating with travel experience for the finalist teams. While the theory, objectives, and practices of the respective cornerstone engineering design programs are similar, the respective cultures are vastly different. Data gathered from the observance of culturally diverse competing teams is studied with the objective of developing curriculum and pedagogy that will prepare the student teams for global engineering practice. In addition, the experiential value of international travel and intercultural exchange inherent in this project is significant.⁶

There is value in all of these efforts to promote our students' growth in intercultural knowledge and yet one area seems to still be optimally unidentified and that is what an educational module in intercultural communication might look like. In a brief paragraph Paretti, McNair and Burgoyne described the skeleton for a unit on cross-cultural communication that included unspecified lectures on cross-cultural issues, selected readings (unspecified) from Thomas Friedman's *The World is Flat*, and scenarios, or role-playing.⁴ The following module is much more comprehensively described and rationalized.

Intercultural Communication for Engineers Inside and Outside of the Professional Experience

While other researchers and educators have largely concentrated on the important aspect of preparing engineers for global experiences within the profession this paper goes a step further and says that engineers need to learn about other people, not just other engineers; and not just how to communicate as engineers, but as people. International experience for the engineer does not occur in the vacuum of the design process but involves creating positive relationships and functioning optimally and with good manners in the entire experience. The need for this kind of competency will also be demonstrated in anecdotal experiences the author relates from personal experience as a faculty member having served in engineering design programs in two very different cultures, the United States and the Middle East. While this paper outlines a practical educational model and interactive workshop for a Middle-Eastern university (PI), it can be modified to other settings.

The outline of this paper may be perceived as a practical course outline for an introduction to intercultural communication as an engineering competency. Because our Middle Eastern students' first language is not English the optimal delivery for the short course would not include long textbook readings but rather presentations and interactive discussions. The introduction and Part I are delivered here. An outline shows the completed module.

Introduction: The Globalization of Engineering Education

Intercultural Communication Inside and Outside of the Professional Experience

Part I Course Outline: The Global Engineer

- Section I. Globalization and You**
- Section II. Global Issues in the 21st Century**
- Section III. The Value of Travel**
- Section IV. Culture and Ethnocentrism**

Part II Course Outline: Intercultural Communication for the Global Engineer

- Section I. Cultural Differences in Religion and Values**
- Section II. Cultural Differences in Manners, Time, and Space**
- Section III. Cultural Differences in Language, Verbal and Non-Verbal Communication**

Part III Course Outline: Professional Intercultural Communication

- Section I. Engineering Practices**
- Section II. Business Practices**
- Section III. Engineers Creating Goodwill**

Part IV Course Outline: Exercises, games, and role-playing

Part I Course Outline: The Global Engineer

The following questions are intended to stimulate interactive discourse with Middle Eastern university students. Special faculty could be brought in to deliver certain sections, depending on the desired scope. For instance, background for question 1 might be delivered by a faculty economist or historian

Section I. Globalization and You

What is globalization and what does it have to do with how we prepare you for your engineering career?

This is a question that provides rationale for the ensuing module. R. C. Jones and B. S. Oberst have identified the need for reform in engineering education in the Arab world and all parts of the world, “as universities prepare graduates to enter the profession of engineering which has been transformed by massive technological developments and by globalization of all aspects of concern to engineers. Engineering educators in the Arab states region face particular challenges in addition to those facing similar educators in other parts of the world (including) tailoring programs to fill the needs of countries that are undergoing rapid modernization.”⁷

The objective of this discussion is to get the students to recognize that globalization is a term that recognizes the increasing interdependency of world industry and business, changes in communication technology and political structures, and migrating populations. Here in the UAE we are a textbook example of this. The UAE is one of the world’s largest producers of oil, and the international community of oil companies brings expatriates here from all over the world to support the rapid development of this industry and supporting industries. Communication technology provides the fingerprint for all residents of the UAE. Here a person’s identity is not recognized by a social security number but rather a cell phone number. And on every street corner is the evidence of migrating populations. The political implications of “Arab Spring” have meant the deportation of many nationalities, while others flock here by the thousands.

How has our university been effected by globalization?

An influx of expatriate students has changed the makeup of our PI student body from largely local Emirati to a mélange of nationalities from Middle Eastern, African and Indian regions. Student design teams are no longer homogeneously “national” but from diverse countries and cultures. This phenomenon has created discomfort and resistance for some students who prefer to work with familiar friends from their own culture. It is important for the students to own this microcosm of a much larger issue.

Section II. Global Issues in the 21st Century

What are some global problems facing the 21st century? Which ones can engineers help to solve?

Create a list from student response; then discuss with the students how many of their answers correspond with those identified by the National Academy of Engineers “14 Challenges for the Future.” This list was compiled by a panel of accomplished engineers and scientists who identified 4 major areas: sustainability, health, reducing vulnerability, and the joy of living.

- Make solar energy economical
- Provide energy from fusion
- Develop carbon sequestration methods
- Manage the nitrogen cycle
- Provide access to clean water
- Restore and improve urban infrastructure
- Advance health informatics
- Engineer better medicines
- Reverse-engineer the brain
- Prevent nuclear terror
- Secure cyberspace
- Enhance virtual reality
- Advance personalized learning
- Engineer the tools of scientific discovery⁸

This exercise helps to connect the students with issues that may have seemed out of their power to influence before. The idea that an engineer may contribute to the eradication of a disease is eye-opening for them. N.A. Mello describes a project-based engineering curriculum at Worcester Polytechnic Institute that extends around the globe. Students are required to complete partial degree requirements in international settings. “Because the interdisciplinary projects involve issues at the interface between society and technology every student becomes aware of the impact of engineering decisions on society and values. A heightened sense of self-knowledge and awareness of their place in the world is an attribute that every student returns with to campus, along with increased awareness of international issues never contemplated before.”⁹ This exercise, like WPI’s interface, is designed to give the students an awareness of their place in the world and their ability to make a difference.

Section III: The Value of Travel

How many of you have traveled internationally? Where?

These questions get the students talking about their personal experiences of travel. Ask them to describe something that surprised them or a problem they encountered – interesting, funny, or awkward- and the value of the experience.

How many of you expect to travel in your careers?

All of the students should raise their hands but many do not. The fact is that engineers travel to other countries to work on projects and engineers work with international teams at their home base. Since many of our students have never traveled out of the United Arab Emirates, the notion of some day working with international teams of engineers in the UAE or in foreign lands

is both intriguing and a source of anxiety. Their lives deeply and daily influenced by Islamic religion and law, and with extended families as their primary subculture, our Emirati students' lives have thus far been highly provincial. In recent years, the influx of expatriate students from the Middle Eastern region has created cultural challenges on both sides, including division and ethnocentrism. Since their future careers as engineers will undoubtedly place them in international settings, concern for our students' ability to function optimally has prompted this effort. It is hoped that a byproduct of this module would be that it not only serve to prepare the students for their careers but to bring about more harmonious relationships on campus.

What is the importance of travel experience in general? Why is it important to your careers?

Employees are looking for engineers who can work in global settings. With more companies expanding into new areas of the world, the need for engineers who are capable of working in more than one culture has increased. G.N Saunders-Smits and E. de Graaff have recognized the need to teach global competency to a future workforce. "Long gone are the days when employee searches were geographically limited. Increasing numbers of employers now seek the best qualified candidate by conducting a global search, regardless of distance, and in some cases, language." ¹⁰

D.L. Pells points out that while travel was not only professionally valuable, he also had a better knowledge of geography and history, and an increased awareness of global issues. ¹¹

Do you think that your education should include preparation for working with people in different countries and in different cultures?

Hopefully the students respond positively.

Section IV. Culture and Ethnocentrism

What is a culture?

For purposes of this discussion a culture should be recognized as a set of shared attitudes, values, goals, and practices that characterize organization or group.

How many cultures are represented in this classroom?

Students will recognize their overall Islamic culture as well as the cultures they bring from various locations in the Middle East and Africa: Emirati UAE, Jordanian, Palestinian, Indian, Pakistani, Iranian, Iraqi, Egyptian, Sudanese, Syrian, etc.

They should also recognize their design team as a culture, their sports teams, their families, their tribes, etc.

What is ethnocentrism?

Ethnocentrism is making value judgments about another culture from the perspective of one's own culture. This can lead to the assertion of superiority of one culture over another. Ethnocentrism is not necessarily a bad thing but the display or assertion of superiority could certainly be considered bad manners in certain situations. My father always used to tell me not to talk about politics or religion at family gatherings. Why do you suppose it's simply good manners to avoid certain culturally based subjects?

As the students learn about other cultures they also consider how they would prepare "foreigners" for experiences in their own culture. What do they want others to know about them? How do they want to be perceived? After all, the global experience is about relationships.

Ethnocentrism is often based on stereotypes about other cultures. In a recent international design forum¹² held at this university a group of students on design teams from the West and the Middle East talked about stereotypes that get in the way communication and positive relationships. The US students were asked what they wanted to say about themselves to their Middle Eastern counterparts. They replied, "We aren't all silly and stupid movie stars – we aren't all rich bullies..." and other media-driven stereotypes. The Middle Eastern students were emphatic to say "We aren't all rich and we aren't terrorists. We don't ride camels anymore and sleep in tents."

How do we learn tolerance and even appreciation for the differences of different cultures?

Avoid judgment, avoid stereotyping, and by all means, study them.

Looking Ahead

What must an engineer learn to be a successful communicator in an international environment?

In order to communicate successfully an engineer should study cultural differences, business practices, language differences, religious differences, and values. Parts II and III deal with these concepts. A test on "How much do you know about other cultures?" might be given at the beginning of this part to see how savvy the students are in identifying cultural differences. Each topic is dealt with from the standpoint of "foreign" cultures but also the culture of the class. Students are asked to describe what they want others to know about their own cultures. Instructors should supply examples and anecdotes for all of the topics. For instance, on the topic of religion, the instructor should encourage traveling engineers to research what religious groups are dominant in the country he/she is visiting, and how religion affects daily activities and business practices. What events, places, are sacred and what prohibitions are there? Our Middle Eastern students have a lot to say on this topic as Islam is the fiber that connects all activities.

The first part of this module makes the case for a new, non-technical competency for engineering students in *intercultural communication*. The role of globalization and the overall expansion of engineering industries across international borders has created this need, and educators should

mindfully consider preparing our students as global citizens who are capable of working tactfully, graciously, and effectively in international settings. Subsequent parts of this module deliver the supporting curriculum.

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