# AC 2011-1072: DEFINING GLOBAL COMPETENCE FOR ENGINEERING STUDENTS

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# Defining Global Competence for Engineering Students

## Abstract

In this study, we collected the opinions of prominent members of engineering industry and academia in order to determine a clear definition of what it means for engineering graduates to be globally competent. The data collection was conducted via an online survey, which was adapted from a survey outlined in Parkinson *et al.*'s 2009 paper entitled "Developing Global Competence in Engineers: What Does It Mean? What Is Most Important?". The similarity between our surveys allowed us to compare our results to the results they presented. We also collected more demographic data, which allowed us to look for relationships between the participants' answers and the way they ranked the thirteen dimensions. We found that only some of the demographic information correlated with some of the competencies, but not all.
Our survey indicated that the top five most important dimensions of global competence are: 1) *the ability to communicate across cultures,* 2) *the ability to appreciate other cultures*, 3) *a proficiency working in or directing a team of ethnic and cultural diversity*, 4) *the ability to effectively deal with ethical issues arising from cultural or national differences*, 5) *possessing understanding of cultural differences relating to product design, manufacture, and use*, and 5) *possessing understand implications of cultural differences of how engineering tasks might be approached*. While more research is needed in this area, it is our hope that these findings will lead to a well-supported definition for what it means to be a globally competent engineer. A definition like this will help engineering universities focus the global education of their students to produce more competitive graduates for the international job market.

## Introduction

As the world's economy becomes more connected, so do the interactions between employees around the world. Engineers are particularly affected because of the rapidly changing technology that continually transforms engineering practice[1]. In fact, because technology regularly crosses so many international boundaries, it has become evident that technology and international interaction are "intrinsically entwined."[2] As universities regularly produce graduates who will work abroad or work alongside coworkers from other cultures, the importance of providing a global education is more pressing than ever. However, the traditional method of engineering education in the United States could be seen as a hindrance that could prevent engineering students from being competitive in the global market. The currently accepted engineering methodology encourages students to "draw a boundary around a problem,"[3] which can prove problematic when working with people who define problems in a different way. According to Downey *et al.* (2006), this difference in defining problems is the key issue when working with people from other cultures and, therefore, becoming "globally competent."[3]

Universities that intend to graduate competitive employees are beginning to realize the importance of teaching global competence to their engineering students; however, since the term "global competence" is not universally defined, they often have trouble focusing a student's global education on a particular area. We examined a number of definitions of global competence—and the methods that were used to determine those definitions—before we settled on which dimensions of global competence to explore further.

*Literature Review*

In a 2009 paper entitled "Preparing Engineers for Global Workforce: A Research University's Response," Ragusa details the University of Southern California's steps to develop their engineering graduates' global competence. A "Global Preparedness Index" was developed to measure USC's engineering students' global competence, which was composed of seven subscales: 1) ethic of responsibility, 2) cultural pluralism, 3) personal efficacy, 4) global-centrism, 5) interconnectedness and global kinship, 6) skilled disposition and open-mindedness, and 7) peaceful resolution.[4] These subscales were adapted from an instrument designed to test "global citizenry" in teachers.[4] While this work was interesting, it was not specified how these subscales were determined. The data that were obtained from this definition of global competence could, therefore, not be replicated for our purposes.

Nelson *et al.* analyzed a study abroad program at Brigham Young University called the Mexico Engineering Study Abroad (MESA) program. In the program, BYU civil engineering students work with civil engineering students from Mexico to design and implement an engineering project where it is needed in Mexico.[5] In this service learning project, they hope to achieve the following learning outcomes for the study abroad students: 1) understanding and appreciation for the way engineering is practiced in Mexico, 2) broader appreciation of how engineers can make a difference in their professional lives, 3) better understanding of how to apply engineering skills, 4) more confidence in sharing engineering with others, 5) make contributions to multi-lingual and multi-cultural teams, 6) become familiar with the Spanish language in the context of the civil engineering profession, 7) prepare reports and presentations that can be presented in international settings.[5] Obviously, those objectives are very specific to the program they are analyzing. While the objectives could be a good definition of global competence, they are too narrow to fit our purposes.

In their 2006 article "The Globally Competent Engineer: Working Effectively with People Who Define Problems Differently," Downey *et al.* explores what it means for engineers to be considered globally competent.[3] After detailing the main conflicts that arise from differing cultures, they outline a "learning criterion" for a course that is designed to help engineering students become globally competent. The learning outcomes for this course are: 1) Students will demonstrate substantial knowledge of the similarities and differences among engineers and non-engineers from different countries; 2) students will demonstrate an ability to analyze how people's lives and experiences in other countries may shape or affect what they consider to be at stake in engineering work; and 3) students will display a predisposition to treat co-workers from other countries as people who have both knowledge and value, may be likely to hold different perspectives than they do, and may be likely to bring these different perspectives to bear in processes of problem definition and problem solution.[3] While these learning outcomes are a substantial step towards defining global competence, they are very broad. It does not provide an explicit definition of what it means to be globally competent, but rather a set of goals that can be achieved in the process to becoming globally competent.

In "Making of a Global Engineer: Culture and Technology," Mazumder further explores the skills necessary for possessing global competence by answering the question: "What kind of specialized skills do we need to enable the crossing of different cultures and world systems with ease?"[2] From the exploration of various educational models, several "global skills" were discovered, including (but not limited to): 1) foreign language capability and insight into communication style; 2) knowledge of culture, customs, social behavioral and group thinking pattern of a region; 3) knowledge of global technology, foreign education system, and business practice; 4) ability to work on projects with multicultural teams face-to-face and through distance; and 5) seeing oneself as part of this diverse universe—a world person.[2]

Jesiek *et al.* took a different approach. Their 2009 paper focused on the students' perspectives of what is most important to becoming globally competent. They surveyed a group of students and provided them with a "Global Engineering Scenario" with which they were supposed to respond by selecting the top five competencies they would need to deal with the scenario out of a list of fifteen competences.[6] The top five competencies selected by the students were: 1) the ability to communicate effectively, 2) the ability to work effectively in diverse and multicultural environments, 3) the ability to evaluate situations to make informed decisions, 4) the ability to work effectively on a team, and 5) the ability to synthesize engineering with business, societal, and environmental perspectives.[6] This was an interesting approach, but we felt as though the listed competencies were too general or did not deal specifically with multicultural competence. Parkinson *et al.* (2009) began to address the problem of defining global competence by exploring the following two research questions: 1) what does it mean to be globally competent? 2) which dimensions of global competence are most important?[1] They first explored the myriad of definitions that already exist for "global competence" and, as a result, developed thirteen dimensions that define what it means to be global competent. Next, they designed a survey that asked members of industry and academia to rank the importance of these thirteen dimensions of global competence and drew conclusions based on the rankings from those two categories. A list of the thirteen dimensions of global competence according to Parkinson *et al.* is as follows:

Global Competence means engineering graduates, [1]

1. Can appreciate other cultures.
2. Are able to communicate across cultures.
3. Are familiar with the histories, governments, and economic systems of several target countries.
4. Speak a second language at a conversational level.
5. Speak a second language at a professional (i.e. technical) level.
6. Are proficient working in or directing a team of ethnic and cultural diversity.
7. Can effectively deal with ethical issues arising from cultural or national differences.
8. Understand cultural differences relating to product design, manufacture, and use.
9. Have an understanding of the connectedness of the world and the workings of the global economy.
10. Understand implications of cultural differences of how engineering tasks might be approached.
11. Have some exposure to international aspects of topics such as supply chain management, intellectual property, liability and risk, and business practices.
12. Have had a chance to practice engineering in a global context, whether through an international internship, a service-learning opportunity, a virtual global engineering project or some other form of experience.

13. View themselves as "citizens of the world," as well as citizens of a particular country; appreciate challenges facing mankind such as sustainability, environmental protection, poverty, security, and public health.

The Parkinson *et al.* study is well designed and implemented; and yet, we were not satisfied with the analysis of their data. The sample size was small and the data they collected were too general to draw many specific conclusions. We explored the research questions further by conducting a similar survey. In our version of the survey, however, we expanded the sample size and collected more demographic data about the participants that is intended to provide additional insight into who values which attributes of global competence and how a person's experiences affect which dimensions he or she thinks is important.

**Objectives**

Our research was conducted to determine which attributes of global competence are most important for an engineer to possess. We believe that a consensus about the definition of global competence will provide engineering universities with a clear direction on which to focus the global education of their students. This will hopefully result in their graduates becoming more competitive in the increasingly diverse global workforce.

**Methods: Survey Design and Implementation**

*Survey Design*

The survey was conducted online and consisted of three parts: 1) a list of thirteen dimensions of global competence that the participants were asked to rate by order of importance, 2) a section for the participants to rate the overall importance of possessing global competence and to provide additional comments, and 3) a series of questions to collect demographic data that was used to analyze the results.

**Part I:** The first part of the survey asked the participants to rate the thirteen dimensions of global competence introduced by Parkinson *et al.* in order of importance according to the Likert scale 1—Not Important, 2—Of Some Advantage, 3—Desirable, 4—Highly Desirable, 5—Essential. It also asked the participants to suggest and provide explanation for other dimensions of global competence that were not included in the survey. Since the survey allowed limited space for questions, the explanations of each dimension of global competence were provided to the participants in the email that invited them to participate in the survey. In order for our results to be compared to the Parkinson *et al.* study, the explanations provided to the participants were the same explanations[1] as in their study.

**Part II:** The second part of the survey asked the participants to rate how important is it that the engineering graduates of today are globally competent. They were given the same Likert scale as in Part I. Part II also included a section for participants to provide additional comments about global competence in general or about the survey itself.

**Part III:** The third and final part of the survey collected demographic information by asking the following six questions:

1. Which profession do you belong to: academia or industry?
2. How long have you been in the workforce?
3. In what country do you currently reside?
4. How much time have you spent living outside the United States of America?
5. How long have you been collaborating internationally in your profession?
6. How long ago was your international collaboration?

*Participant Recruitment*

The potential participants were selected from among the Primary Investigator's professional contacts. An email was sent to potential participants that included the link to the online survey. Participants were only allowed to complete the survey if they consented to be a part of the study. There was no pressure from the PI to participate in the survey since there was no compensation given for participating in the survey and no retribution resulted in a potential participant choosing not to participate (or deciding not to finish the survey once it had been started). Additionally, the survey results were anonymous so the investigators did not know who chose to participate and who did not, nor could they attribute specific responses made to any particular respondent. This study was approved by Vanderbilt's Institutional Review Board (IRB #100857).

The participants were solicited because of their expertise and leadership in their chosen field. Overall, 27 participants were members of academia, while 21 participants were members of industry. Industry participants were recruited from a wide variety of types of engineering companies (including biomedical, oil & gas, automotive, manufacturing, construction, and aerospace) with all participants being a leader of at least a division of the company, if not an executive vice-president or CEO. Academic participants were recruited from a wide variety of types of engineering fields (including civil, biomedical, electrical, mechanical, chemical, and computer science) with all participants being leaders in their fields as judged by tenure status or promise (as determined by awards such as NSF CAREER awards).

## Results

*Quantitative Results: Which dimensions received the highest ratings?*

**Figure 1** and **Figure 2** are the results from Parts I and II of the survey, where the importance of each of the thirteen dimensions of global competence was ranked on a Likert scale of 1 to 5, 1 being "Not Important" and 5 being "Essential." The competencies are listed in the order that they appeared on the survey. The overall importance of possessing global competence is displayed as the rightmost column in each graph.

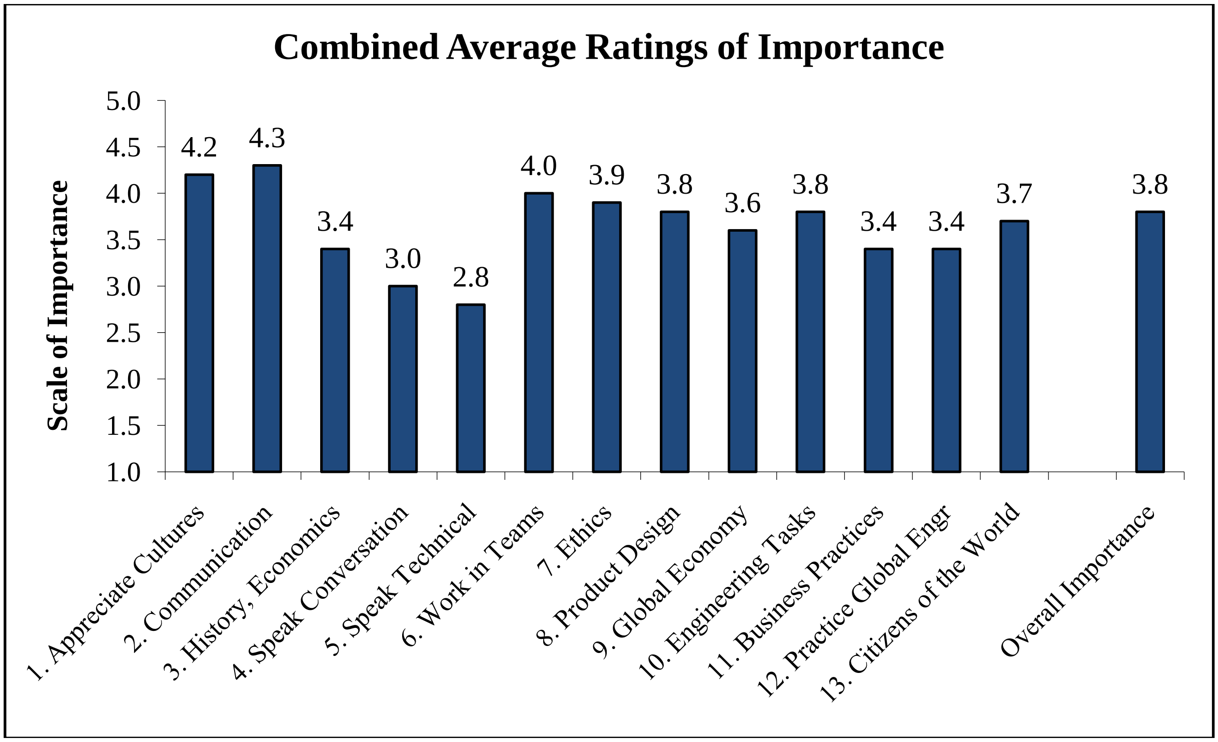


***Figure 1.*** *This graph displays the average ratings of importance for all survey participants (regardless of profession) for the 13 dimensions of global competence.*

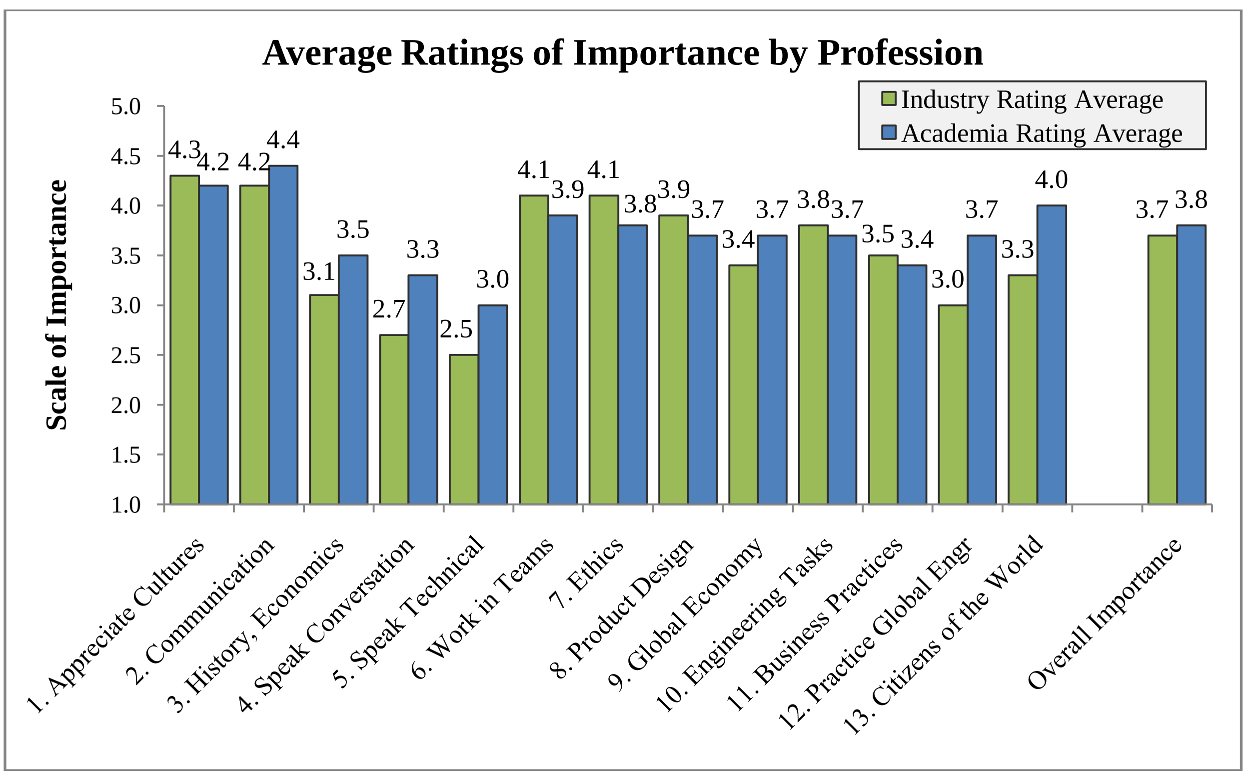


***Figure 2.*** *This graph displays the average ratings of importance for each of the 13 dimensions of global competence, separated by profession.*

In order to clearly see which dimensions were ranked as most important, the dimensions were graphed in order of descending importance in **Figure 3**.

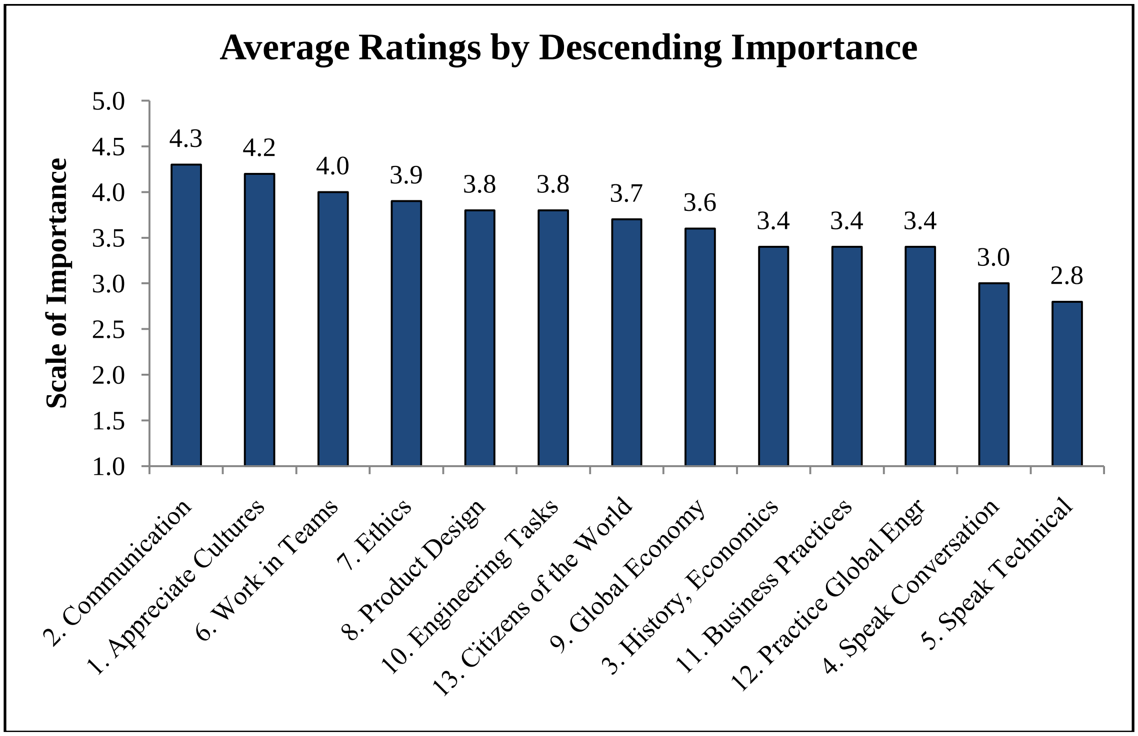


***Figure 3.*** *This graph displays the average rating of each dimension of global competence in order of importance. The order of importance (highest to lowest rating) goes from left to right.*

The dimensions of global competence are very much abbreviated in **Figures 1** through **3**, so **Table 1** was created to clarify which dimensions received the highest ratings.

***Table 1.*** *This is a tabular representation of the overall ratings of importance of the thirteen dimensions of global competence, where the description of each dimension is expanded.*

| Dimension of Global Competence | Combined Rating | Academia Rating | Industry Rating |
|---|---|---|---|
| The ability to communicate across cultures. | 4.3 | 4.4 | 4.2 |
| The ability to appreciate other cultures. | 4.2 | 4.2 | 4.3 |
| A proficiency working in or directing a team of ethnic and cultural diversity. | 4.0 | 3.9 | 3.1 |
| The ability to effectively deal with ethical issues arising from cultural or national differences. | 3.9 | 3.8 | 2.7 |
| The possession of an understanding of cultural differences relating to product design, manufacture, and use. | 3.8 | 3.7 | 2.5 |
| The ability to understand the implications of cultural differences of how engineering tasks are approached. | 3.8 | 3.7 | 4.1 |

| | | | |
|---|---|---|---|
| The view of oneself as a "citizen of the world," as well as a citizen of a particular country; ability to appreciate challenges facing mankind such as sustainability, environmental protection, poverty, security, and public health. | 3.7 | 4.0 | 4.1 |
| The possession of an understanding of the connectedness of the world and the workings of the global economy. | 3.6 | 3.7 | 3.4 |
| The familiarity with the histories, governments, and economic systems of several target countries. | 3.4 | 3.5 | 3.3 |
| The exposure to international aspects of topics such as supply chain management, intellectual property, liability and risk, and business practices. | 3.4 | 3.4 | 3.9 |
| The chance to practice engineering in a global context, whether through an international internship, a service-learning opportunity, a virtual global engineering project or some other form of experience. | 3.4 | 3.7 | 3.8 |
| The ability to speak a second language at a conversational level. | 3.0 | 3.3 | 3.5 |
| The ability to speak a second language at a professional (i.e. technical) level. | 2.8 | 3.0 | 3.0 |

From these results, it can be determined that the top five most important dimensions of global competence, as indicated by our survey, are:

1. The ability to communicate across cultures.
2. The ability to appreciate other cultures.
3. A proficiency working in or directing a team of ethnic and cultural diversity.
4. The ability to effectively deal with ethical issues arising from cultural or national differences.
5. Possessing understanding of cultural differences relating to product design, manufacture, and use.
5. Possessing understand implications of cultural differences of how engineering tasks might be approached.

These results are from the overall importance ratings (academia and industry combined). There was a tie for the fifth most important dimension, so both are displayed.

*Qualitative Results: What did the participants have to say?*

When asked to provide additional dimensions to describe global competence, the participants brought up some interesting issues. Some participants stressed the need for increased global awareness:

> "[The] ability to conform to other standards is of prime importance. Understand that what is acceptable in one country may well be against U. S. law."

"An incredibly strong "customer orientation" is required. [Among] other team members, product procurers, ultimate users, payers and regulators, the customer fanatic will always be most responsive."

While others suggested more specific descriptions of the dimensions of global competence in question:

"I think respect goes along with appreciate other cultures—and that others understand you feel that way is vital."

"[An additional competency could be] a proficiency in not just one, but multiple foreign languages."

When asked for additional comments about the need for global competence in general, the participants had very diverse replies. Some participants felt that being globally competent is not necessary for all types of engineers:

"Some of these answers may depend on the type of engineering and the industry. For example, it is more essential that engineering management graduates are globally competent than civil engineering graduates."

"All engineering graduates need some background in global engineering-related issues, as currently suggested by ABET criteria. Only engineering graduates who envision a career [for themselves] in a globally connected organization would need the more extensive preparation described by the items on the previous page. I do not see this as a necessary competence for all engineering graduates."

"Not all need be, but those that are should be strongly competent. Others may be marginally or not at all competent."

Others stressed the increasing importance of global competence for more types of graduates:

"With the advent of the internet and improved transportation services and global "access", the world is truly a global economy and a global marketplace - - without "global competency" and global awareness, engineers will not be able to compete and succeed."

"Increasingly, businesses are becoming more global and are seeking employees who are globally mobile. Being willing to consider jobs outside one's home country greatly expand the job opportunity universe. Being globally competent increases the probability of capturing one of those opportunities. More and more, global experience is a prerequisite for advancing into upper management ranks."

One participant made the point that a person can receive a global education in unexpected places:

"There is an issue along the "diversity vs. global continuum". Does an experience that stretches your comfort zone or that increases you cultural appreciation also need to be global? For example, study abroad in Australia is a global experience but does not necessarily increase one's appreciation of cultural difference. Conversely, working on building a water system in a Chicano village near the Mexican border is not a global experience but requires knowledge of a different language and culture. Where does one draw the line?"

*Demographic Results: Who took the survey?*

**Figures 4** through **7** visually represent the answers to the demographic questions outlined in the Survey Design section. There were a total of 48 participants in the survey. In the question that asked for the length of time since the participant's last international collaboration, 46 out of the 48 participants answered the question.

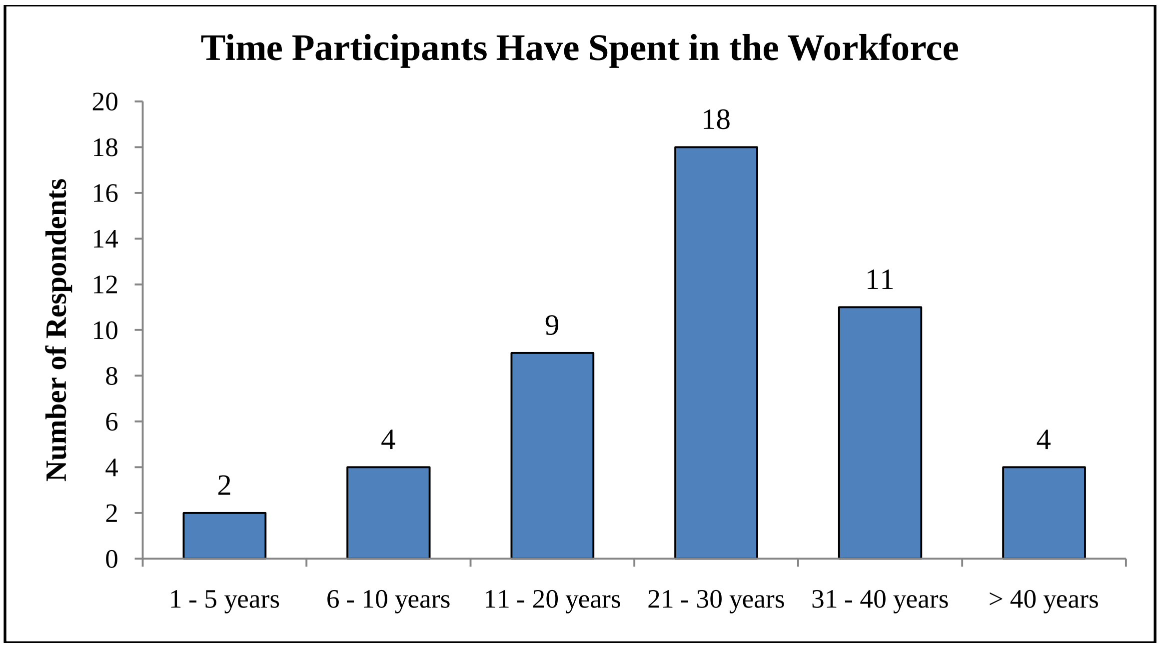


***Figure 4.*** *This graph shows how long the participants have been in the workforce. There were a total of 48 participants for this question.*

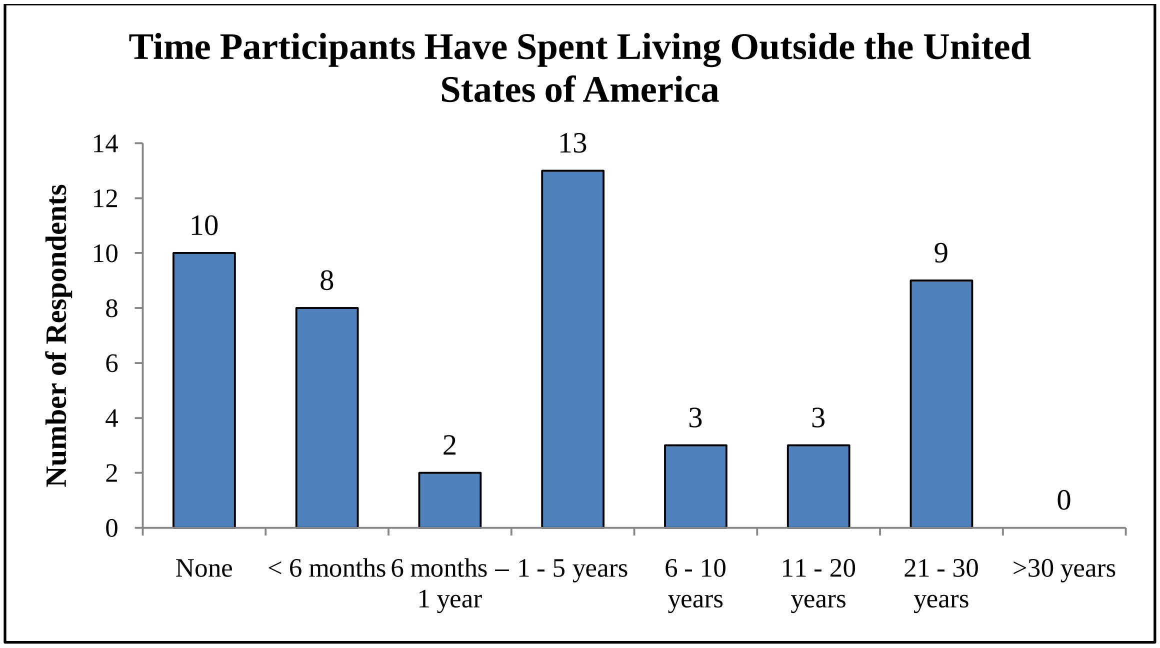


***Figure 5.*** *This graph shows the length of time that the participants have spent living outside the United States of America. There were 48 participants for this question.*

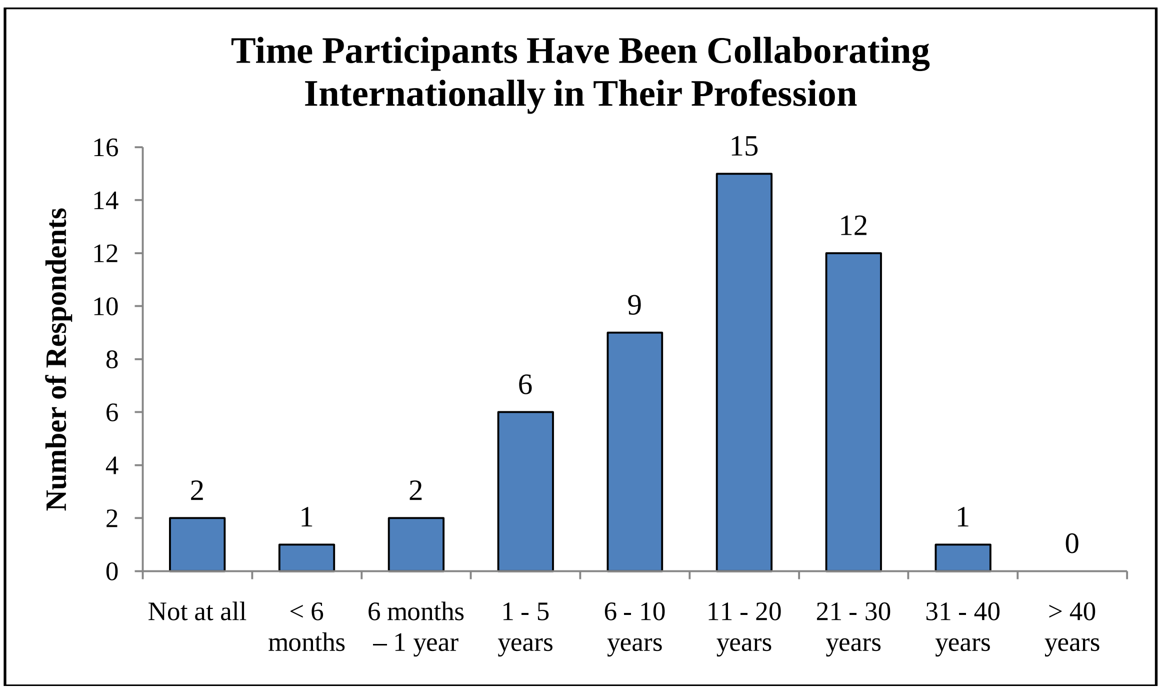


***Figure 6.*** *This graph shows how long the participants have been collaborating internationally within their profession. There were 48 participants for this question.*

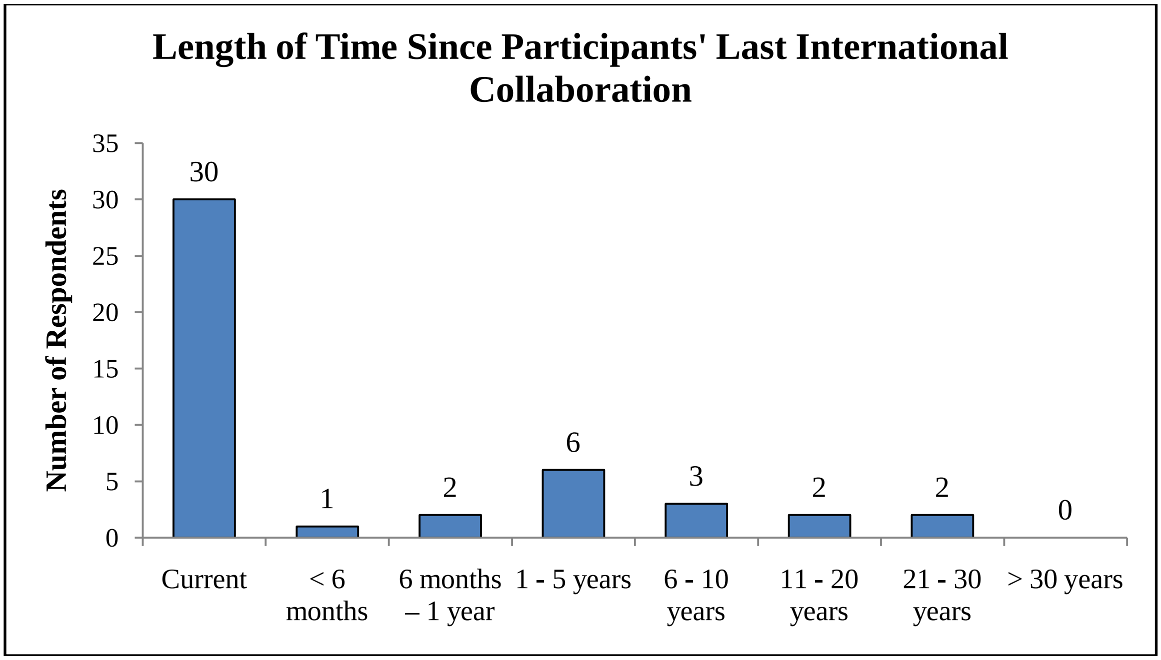


***Figure 7.*** *This graph shows the length of time since the participants have collaborated internationally. Out of the 48 respondents, 46 of them answered this question.*

We believe that two of the respondents did not answer because there was not an option to answer "never collaborated internationally."

In order to compare our results with those of the Parkinson *et al.* study (and increase our sample size), we found the weighted average between their data sets and our data sets. The weighted average for the data was found by using the following method:

$$\frac{[(Parkinson\ rating\ *\ Parkinson\ sample\ size) + (our\ rating\ *\ our\ sample\ size)]}{Parkinson\ sample\ size\ +\ our\ sample\ size}$$

This method was used for both the academic and industry data. The results are tabulated in **Tables 2** and **3**.

***Table 2.*** *This table shows the weighted average of the results from the participants who are members of academia. Our sample size was 27, whereas the Parkinson* et al. *sample size was 15.*

| Dimension of Global Competence | Parkinson Academia Rating | Our Academia Rating | Weighted Average Rating |
|---|---|---|---|
| 1. Appreciate Cultures | 4.6 | 4.2 | **4.3** |
| 2. Communication | 4.3 | 4.4 | **4.4** |
| 3. History, Economics | 3.3 | 3.5 | **3.4** |
| 4. Speak Conversation | 3.5 | 3.3 | **3.3** |
| 5. Speak Technical | 3.1 | 3.0 | **3.0** |
| 6. Work in Teams | 4.7 | 3.9 | **4.2** |
| 7. Ethics | 4.1 | 3.8 | **3.9** |
| 8. Product Design | 3.7 | 3.7 | **3.7** |
| 9. Global Economy | 4.1 | 3.7 | **3.9** |
| 10. Engineering Tasks | 4.1 | 3.7 | **3.9** |

| | | | |
|---|---|---|---|
| 11. Business Practices | 3.3 | 3.4 | **3.4** |
| 12. Practice Global Engineering | 4.5 | 3.7 | **4.0** |
| 13. Citizens of the World | 4.2 | 4.0 | **4.1** |

***Table 3.*** *This table shows the weighted average of the results from the participants who are members of industry. Our sample size was 21, whereas the Parkinson* et al. *sample size was 16.*

| Dimension of Global Competence | Parkinson Industry Rating | Our Industry Rating | Weighted Average Rating |
|---|---|---|---|
| 1. Appreciate Cultures | 4.5 | 4.3 | **4.4** |
| 2. Communication | 4.5 | 4.2 | **4.3** |
| 3. History, Economics | 2.5 | 3.1 | **2.9** |
| 4. Speak Conversation | 3.9 | 2.7 | **3.2** |
| 5. Speak Technical | 3.6 | 2.5 | **3.0** |
| 6. Work in Teams | 4.4 | 4.1 | **4.2** |
| 7. Ethics | 4.2 | 4.1 | **4.1** |
| 8. Product Design | 3.9 | 3.9 | **3.9** |
| 9. Global Economy | 3.6 | 3.4 | **3.5** |
| 10. Engineering Tasks | 3.5 | 3.8 | **3.6** |
| 11. Business Practices | 3.6 | 3.5 | **3.5** |
| 12. Practice Global Engineering | 3.9 | 3.0 | **3.4** |
| 13. Citizens of the World | 3.9 | 3.3 | **3.5** |

From this combination of data sets, it can be seen that a new top five important global competencies emerge for each profession:

*For Academia:*

1. The ability to communicate across cultures.
2. The ability to appreciate other cultures.
3. A proficiency working in or directing a team of ethnic and cultural diversity.
4. The view of oneself as a "citizen of the world," as well as a citizen of a particular country; ability to appreciate challenges facing mankind such as sustainability, environmental protection, poverty, security, and public health.
5. The chance to practice engineering in a global context.

*For Industry:*

1. The ability to appreciate other cultures.
2. The ability to communicate across cultures.
3. A proficiency working in or directing a team of ethnic and cultural diversity.
4. The ability to effectively deal with ethical issues arising from cultural or national differences.
5. The possession of an understanding of cultural differences relating to product design, manufacture, and use.

**Analysis of Results**

*Academia vs. Industry Results: How do they compare?*

A two sample t-test was used to compare the results between the data from those in the academia profession and those in the industry profession. The t-test assumed that the variances of the data sets were unequal. The confidence was set at 95% with an alpha of 0.05.

Of the thirteen dimensions (and the overall importance rating) we asked the participants about, only five showed a statistically significant difference between the academics and members of industry. Those dimensions were:

- The familiarity with the histories, governments, and economic systems of several target countries ($p<0.04$),
- The ability to speak a second language at a conversational level ($p<0.02$),
- The ability to speak a second language at a professional (i.e. technical) level ($p<0.03$),
- The chance to practice engineering in a global context, whether through an international internship, a service-learning opportunity, a virtual global engineering project or some other form of experience ($p<0.0005$),
- The view of oneself as a “citizen of the world,” as well as a citizen of a particular country; ability to appreciate challenges facing mankind such as sustainability, environmental protection, poverty, security, and public health ($p<0.01$).

The other eight dimensions from our survey did not show a significant difference between the academia and industry results.

*Statistical Analysis of Demographic Data: How do experiences influence opinion?*

The data was again analyzed to see if there was any correlation between the answers to the demographic questions and the way the participants ranked the dimensions of global competence. A Spearman Rank Test was used to determine Spearman’s rank correlation coefficient between each demographic question and each dimension of global competence. There were no correlations between how long a participant has been in the workforce and any of the competencies or the overall rating. There were no correlations between how long a participant had been collaborating internationally and any of the competencies.

The amount of time spent living out of the US has a statistically significant ($p<0.02$) correlation ($r=0.333$) with global competency #12 (“*have had a chance to practice engineering in a global context, whether through an international internship, a service-learning opportunity, a virtual global engineering project or some other form of experience*”).

The time since the participant’s last international collaboration has a statistically significant ($p<0.04$) correlation ($r=0.302$) with global competency #4 (“*speak a second language at a conversational level*”).

*Comparison to Literature*

As can be seen from **Tables 2** and **3**, most of our results were similar to the weighted averages between our results and the results from the Parkinson *et al.* study. A few notable exceptions for our data on the academia side include the two dimensions *"a proficiency working in or directing a team of ethnic and cultural diversity"* and *"the chance to practice engineering in a global context, whether through an international internship, a service-learning opportunity, a virtual global engineering project or some other form of experience."* These two dimensions had the largest difference from the weighted average. On the industry side of our data, the largest differences were seen in the dimensions *"the ability to speak a second language at a conversational level," "the ability to speak a second language at a professional (i.e. technical) level,"* and *"the chance to practice engineering in a global context, whether through an international internship, a service-learning opportunity, a virtual global engineering project or some other form of experience."*

When the weighted averages of the industry and academia data were compared to the results that we obtained from our survey alone, it was discovered that three of the competencies (*"the ability to appreciate other cultures," "the ability to communicate across cultures,"* and *"proficiency working in or directing a team of ethnic and cultural diversity"*) appeared on all three lists. In fact, these competencies were consistently the top three highest rated competencies in each list.

**Discussion and Conclusion**

The objective of this study was to provide an explicit definition for what it means to be a globally competent engineer. What we have determined is that such a definition is not only difficult to agree upon, but it also could hold different meanings for different groups of people. The results from our survey did make it clear that "global competence" cannot be defined by a single dimension; its definition has to include a myriad of characteristics and thought patterns to help quantify such an abstract concept.

We began with a definition that contains thirteen dimensions of global competence. Our challenge was to determine which of these dimensions are most important for a "globally competent engineer" to possess in order to be a successful member of the global workforce. Our qualitative results brought up some interesting issues about global competence, including the idea that certain aspects of global competence could be more relevant to different types of engineers. Our quantitative results indicate that certain global competencies are held in higher esteem than others. Specifically, the qualities that consistently received a high rating were characteristics such as good communication skills, appreciation of cultural difference, and teamwork. This indicates that the corresponding global competencies were more important to the participants and, therefore, a good representation of what a definition of global competence could be.

It is clear from our results, however, that the importance of certain dimensions of global competence is not easily agreed upon. There was some discrepancy between the answers from members of academia and members of industry and also some difference from the results that were obtained in the Parkinson *et al.* study. These differences can lead to the conclusion that different people value different degrees and types of global competence.

The ambiguity in our results speaks to the complexity of the issue at hand: what should engineering universities attempt to impart on their students in order to prepare them to be globally competent employees? Also, whose opinion is most relevant when deciding what an engineering student should know? While it may seem daunting for an individual to master all thirteen dimensions of global competence, our survey provides a way to concentrate on the most important or helpful aspects of global competence. Since our results come from the opinions of experts in the field of global thinking, we believe that engineering universities should focus their education on the top three dimensions of global competence that we found from our survey. Proficiency in these areas should allow engineering students to not only be more globally competent employees, but also most culturally diverse individuals.

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