AC 2012-3402: GLOBAL STUDIES: A STUDY ON WHY MORE ENGINEERING STUDENTS DO NOT PARTICIPATE

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Abstract

This paper discusses the development of a survey administered to undergraduate engineering students in order to determine the prohibiting factors for studying abroad. The analysis of survey data examines 1) if there are differences among gender, classification and/or program of study, 2) why students do not study abroad, 3) funding level needed to study abroad, and 4) where students want to study abroad. Results from this survey show that a significant number of students do want to study abroad, but a shortage of finances is the primary prohibiting factor.

Introduction

Due to the ever increasing world economy, there is a growing need for students to be able to live, learn and understand other cultures and environments[2]. ABET outcome h ("the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context"[1]) and the report released by the National Academy of Engineering on Educating the Engineer of 2020[3] have provided further motivation for engineering educators to address this need. This paper will discuss the development of an online survey administered to undergraduate engineering students at the University of Arkansas across eight departments including the Freshman Engineering Program within the college to determine the factors prohibiting students from studying abroad. The analysis of survey data examines 1) if there are differences among gender, classification and/or program of study, 2) whether students do not study abroad due to financial, class selection, time, and/or other reasons, 3) what percent of the cost associated with studying abroad the students need to have covered in order to be able to afford to study abroad, and 4) where students wish to study abroad.

Survey

To collect the necessary data, a survey was designed with input from faculty, staff, and students. It was than piloted and refined with feedback from 140 students. The new survey was developed using Qualtrics Labs, Inc. academic survey research suite. This suite provided a method to create, distribute, record, and analyze surveys. Both surveys were approved by the University of Arkansas's Internal Review Board (IRB). After the digital survey was created, it was sent to the undergraduate engineering student body at the University of Arkansas, which consisted of 2,374 students. To encourage the students to complete the survey, students could enter a random drawing to win an Apple IPad 2 or one of four ITunes gift cards. This contributed to the 25.5% response rate that was achieved.

The survey contained general demographic, previous travel experience, and specific study abroad questions. The students were asked the following questions:

Q1: What is your classification?
Q2: What department are you a part of?
Q3: Are you a member of the Honors College?

Q4: Gender
Q5: Are you an international student?
Q6: Have you traveled outside of the United States?
Q6A: Where have you traveled?
Q6B: Reason for travel?
Q6C: How many times?
Q6D: Average Period
Q7: Are you aware of the study abroad resources that the Office of Study Abroad offers?
Q8: Which of the following engineering study abroad programs are you aware of?
Q9: Would you like to study abroad?
Q9A: Why do you not want to study abroad?
Q10: What type of study abroad experience do you desire?
Q11: Where would you like to study abroad?
Q12: What is prohibiting you from studying abroad?
Q13: Semester study abroad experiences cost around $15,000. What level of support in terms of scholarships would you need in order to make such an experience a possibility for you?
Q14: Summer study abroad experiences cost around $8,000. What level of support in terms of scholarships would you need in order to make such an experience a possibility for you?

Logic was programmed into the survey to prevent inaccurate responses for various questions. For example, it would have been inappropriate for a student to answer questions about international travel if he or she had never been abroad, so these questions were skipped if the student responded that they had not previously traveled internationally.

Respondent Demographics

The responses from this survey provided insight about the students and their interest in studying abroad. According to the responses, 73% of the students were male and 27% female. This was higher than the 18% female engineering enrollment at the University of Arkansas. The classification of the respondents and the University of Arkansas engineering enrollment is shown in Figure 1. These results indicate a response rate that is closely matched with the engineering classification.

Answer	Respondents' Graph	Respondents	Engineering
Freshman		39%	34%
Sophomore		22%	21%
Junior		16%	18%
Senior		22%	27%

Figure 1: Student Classification

These students are in one of eight engineering departments at the University of Arkansas which included the Freshman Engineering Program. Freshman engineering had the most respondents,

31%. Figure 2 shows the complete department distribution for the respondents and actual University of Arkansas engineering enrollment.

Answer	Respondents' Graph	Respondents	Engineering
Freshman Engineering (FEP)		31%	39%
Biological Engineering (BE)		7%	5%
Chemical Engineering (CHEG)		10%	8%
Civil Engineering (CVEG)		10%	9%
Computer Science & Computer Engineering (CSCE)		12%	11%
Electrical Engineering (EE)		7%	8%
Industrial Engineering (IE)		8%	6%
Mechanical Engineering (ME)		14%	15%

Figure 2: Engineering Department Distribution

Since many students who currently study abroad are part of our Honors Program, it was important to capture the honors status for each student. This status is seen in Figure 3. The Honors College provides funding opportunities to honors students who wish to study abroad making it attractive for them to do so.

Answer	Respondents' Graph	Respondents	Engineering
Yes		38%	24%
No		62%	76%

Figure 3: Honors College Status

Some of the other important statistics included learning if the respondents were an international student or if they have traveled abroad previously. This information was important to determine any bias towards international travel. It was found that 7% of the respondents were international students and 70% of the respondents have traveled outside the United States with vacationing being the primary reason for travel. Only 10% of those who have traveled outside the United States did so for a study abroad experience.

By comparing the survey demographics to actual engineering enrollment for fall 2011, it was clear that the 25.5% response rate captured a good representative sample from the entire college. Notable differences were that a higher percentage of females and honors students participated in the survey.

Analysis: Wanted to Study Abroad

After verifying the survey responses provided a good representation of the engineering student body, the responses were analyzed first by looking at only those who wanted to study abroad. This was completed by filtering the results and looking at questions 10 through 12 to determine

if a difference existed based upon gender, classification, department, or honors. Each questions' answers were normalized since the respondent could select multiple answers.

The first filter used was based upon gender. Figure 4 shows the normalized non-filtered and filter results for questions 10 through 12. It was found that the gender of the respondent did not significantly affect the preference. Both genders preferred a summer study abroad experience in Europe, but determined finances were the major prohibiting factor.

Question	Response	No Filter	Filter	
		Original	Male	Female
Q10: What type of study abroad experience do you desire?	Semester	37%	39%	33%
	Year	13%	13%	12%
	Summer	50%	48%	55%
Q11: Where would you like to study abroad?	Central America	10%	10%	11%
	South America	13%	13%	14%
	Australia	25%	26%	25%
	Europe	33%	33%	34%
	Asia	15%	16%	14%
	Other	3%	3%	3%
Q12: What is prohibiting you from studying abroad?	Finances	42%	41%	43%
	Loss of Income	7%	8%	4%
	Time	24%	23%	26%
	Class Selection	16%	15%	18%
	Nothing	7%	8%	4%
	Other	5%	5%	5%

Figure 4: Normalized Q10-Q12 Gender Comparison

The next three filters developed the same results as gender. The classification, department, or honors status did not significantly affect the preference.

Analysis: Did Not Want to Study Abroad

After analyzing those who wanted to study abroad, the 20% who did not want to study abroad was examined using the same process as the previous section except only looking at Question 9A. This question was only presented to those students whom indicated in Question 9 that they did not want to study abroad. Question 9A helped determine why a student would not want to study abroad. The same choices were used from Question 12 with the exception of nothing. By using the same choices, the information could be compared.

Gender was the first filter applied as seen in Figure 5. This figure shows that time, with a normalized response of 32%, and finances, with a normalized response 30%, were the main reasons for not wanting to study abroad. When the data was filtered by gender, finance and time were still the main factors, but more females listed finance (33%) than time (26%).

Answer	No Filter	Filtered	
	Original	Male	Female
Finances	30%	29%	33%
Loss of Income	8%	7%	14%
Time	32%	34%	26%
Class Selection	10%	10%	14%
Other	19%	20%	14%

Figure 5: Normalized Q9A: Gender Comparison

The next filter was based upon classification. The results of this filter are shown in Figure 6. As the students go from freshmen to seniors their top two choices change. Freshmen responded with finances (33%) while sophomores indicated that finances and time (30%) were equally the main reason for not wanting to study abroad. The juniors and seniors both responded with time being the major reason.

Answer	No Filter	Filtered			
	Original	Freshman	Sophomore	Junior	Senior
Finances	30%	33%	30%	27%	29%
Loss of Income	8%	8%	2%	13%	9%
Time	32%	30%	30%	29%	39%
Class Selection	10%	3%	17%	15%	9%
Other	19%	25%	21%	15%	14%

Figure 6: Normalized Q9A: Classification Comparison

Lastly, the data was filtered by the respondents' department as seen in Figure 7. The students in freshman engineering (FEP) and mechanical engineering (ME) responded with finance and time as equal major factors, biological engineering (BE) students listed class selection (22%) as the second most important factor with time (50%) being the major factor, electrical engineering (EE) listed finances (40%) as the major factor, and industrial engineering (IE) students listed other (31%) as the most important factor. The other factors for the IE students ranged from being a resident assistant for housing to no interest. No two responses were the same for IE responses.

Answer	No Filter	Filtered							
	Original	FEP	BE	CHEG	CVEG	CSCE	EE	IE	ME
Finances	30%	33%	17%	25%	32%	29%	40%	28%	31%
Loss of Income	8%	5%	0%	9%	16%	9%	0%	7%	11%
Time	32%	33%	50%	28%	40%	33%	33%	28%	31%
Class Selection	10%	0%	33%	22%	0%	16%	13%	7%	11%
Other	19%	30%	0%	16%	12%	13%	13%	31%	17%

Figure 7: Q9A: Engineering Department Comparison

Funding Level

The funding level questions were designed to determine how much support was needed to study abroad. These questions used an estimated total cost to ensure that each student was thinking about the same total cost. Required funding levels were determined for semester and summer programs. These questions were answered by students who indicated that finances or loss of income were the reasons they did not want to study abroad and by those who wanted to study abroad.

Figure 8 shows the required funding level for a semester abroad as reported. Most students required 80 to 100% of the total cost.

Answer		Response
0 – 19% ($0 -$2,850)		2%
20 – 39% ($3,000 - $5,850)		4%
40 – 59% ($6,000 – $8,850)		16%
60 – 79% ($9,000 – $11,850)		24%
80 – 100% ($12,000 - $15,000)		54%

Figure 8: Q13: Semester Study Abroad Required Funding Levels

Figure 9 shows the required funding level for a summer abroad. According to the survey, 80 to 100% of funding was required.

Answer		Response
0 – 19% ($0 -$1,520)		2%
20 – 39% ($1,600 - $3,120)		8%
40 – 59% ($3,200 – $4,720)		16%
60 – 79% ($4,800 – $6,320)		22%
80 – 100% ($6,400 - $8,000)		51%

Figure 9: Q14: Summer Study Abroad Required Funding Levels

This data clearly showed that many students need financial assistance to study abroad. 90% of the responses were for funding levels of 40 – 100%. The 0 – 39% range stayed below 10% of funding no matter the gender, classification, department, or honors status of the students.

Conclusion

Due to the changing world economy, ABET outcome h, and the National Academy of Engineering on Educating the Engineer of 2020, it was apparent that more engineering students need to participate in global studies. To help determine why many engineering students do not study abroad at the University of Arkansas, a survey was created. The major results from this survey are summarized below:

- 50% of students prefer a summer study abroad experience
- 33% of students would like to study abroad in Europe
- 42% of students believe finances is the major prohibiting factor
- Time and finances are the major reasons why most students do not want to study abroad, but are dependent upon gender, classification, department, and honors status
- More than 50% of students stated that 80 -100% of funding was needed to study abroad for a semester or summer program.

Future Work

Even though this survey showed interesting results, future work is required. This survey only examined undergraduate engineering students at the University of Arkansas. To develop more robust results, the survey will be expanded and sent to other engineering students in the United States to determine any regional or collegiate differences. Another next step is to use the data to find new funding sources to make studying abroad a possibility for more students. This survey's results, for example, can help the College of Engineering Development Office acquire funds for global studies.

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