Issues of Privilege in University Service-Learning

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***Abstract* – Service-learning activities, such as development projects organized under the Engineers Without Borders USA organization, are popular on many university campuses as a mechanism for providing applied, global learning experiences for both engineering and non-engineering students. Existing studies have found that these experiences are meaningful for students and help them to apply what they learn in the classroom to the "real world" while learning valuable teamwork, communication, project management, and other skills. In this paper, we report on our ongoing research about EWB-USA participation and outcomes and, using case studies from our ethnographic research, discuss barriers to EWB-USA project participation among less privileged students. The implications this issue has for institutions interested in using service-learning to meet core learning outcomes as well as the need to diversify service-learning will be considered.**

Index Terms – Humanitarian engineering, service-learning, diversity, privilege, international development.

INTRODUCTION

Service-learning has become popular in engineering education as a way to meet a variety of learning outcomes and prepare students to work in real-world settings in which they will have to collaborate with diverse professionals and stakeholders to set goals and design systems to meet these goals[i]. As industry seeks professionals who "possess both strong technical skills and a broader set of capabilities that allow them to lead innovation, work across disciplines, and thrive on multi-cultural teams," service-learning is widely seen as an important way to help students gain these skills[ii]. Service-learning opportunities can help meet ABET accreditation standards that specify "that engineers must have a broad education necessary to understand the impact of engineering solutions in an environmental and societal context"[iii]. As students will be increasingly working in a global context, international service-learning has become popular since it provides opportunities to work across national and cultural borders[iv]. "Learning Through Service" opportunities take a variety of forms from projects that take place in the context of specific courses to extra-curricular projects and programs (that are sometimes also integrated into course work)[v]. In some cases, service-learning is undertaken with the

goal of developing particular skills, while some have argued for incorporating such activities with the goal of recruiting and retaining a more diverse student body or creating a new generation of engineers who are more socially aware, more able to protect the environment, and more oriented towards "engineering to help" or humanitarian engineering[vi].

A mounting body of evidence demonstrates that these experiences are beneficial and impactful for students (see literature review below), so it is important to ensure that these opportunities are accessible to as many students as possible. "Service-learning courses are evolving in engineering colleges as a mechanism to elevate student communication skills, and provide engineering students with meaningful, community-based learning experiences. Research has found that people involved in service-learning experiences can improve academic learning of material and provide participants with a deeper understanding of the social context of their work"[vii]. Many colleges and universities also rely on extracurricular activities (among others) to provide access to service-learning and advertise student clubs and organizations to prospective students. Engineers Without Borders USA (EWB-USA) is an especially prominent example with chapters at 169 colleges and universities across the country. EWB-USA chapters are generally extracurricular and student-run with support from faculty, professional mentors, and EWB-USA staff.

EWB-USA chapters take on 5-year project commitments that include assessment, design, construction, evaluation, and monitoring. These projects aim to work with communities to meet needs for clean water, sanitation, and other types of infrastructure (foot bridges, energy projects, etc.). The overall goal of the larger organization is to help meet basic human needs in the developing world and to "equip leaders to solve the world's most pressing challenges" (EWB-USA mission statement). This includes encouraging students to gain skills in project management and working with diverse others, as well as helping them to gain a global perspective and generally fostering an orientation towards "engineering to help." In a study of over 500 EWB-USA members, Litchfield and Javernick-Will found that participation in EWB-USA specifically enabled individuals to expand their global perspectives, improve relationships with others, broaden their experiences, and improve project management skills.[viii]

Our larger research project seeks to understand how students, faculty, and professionals experience this work and how it affects them. It also aims to understand what makes projects successful, what roadblocks exist, what might lead to failures, and how communities are impacted. In this paper, we present preliminary results from our ethnographic work with EWB-USA chapters and our examination of project documents. Given that service-learning has clear benefits for students, it is important to examine who is able to participate and why so that systematic barriers to participation can be addressed. We use a case study approach and examine two chapters, one that has been very successful and another that has struggled to sustain participation and complete a project. We examine the differences in these institutions and their student bodies to draw out what forms of privilege enable participation and what barriers exist for less privileged students. We end by contextualizing these two chapters and highlighting the implications these findings have for engineering education more generally.

LITERATURE REVIEW

Evidence that participation in service-learning in general, and in EWB-USA in particular, has positive impacts on students has been noted across the literature. Zarske et al. (2011) cite various studies: "UCLA's Higher Education Research Institute conducted a longitudinal study of over 22,000 college undergraduates, concluding that the use of service-learning pedagogy has significant positive effects on students' academic performance (GPA, writing skills, critical thinking skills), leadership skills, and increased commitment to continued civic participation [while] 68% of students engaged in the Engineering Projects in Community Service (EPICS) projects from Purdue University reported that participation in service-learning positively impacted their determination to continue in engineering."[ix] Sevier et al.[x] have also reviewed the efficacy of numerous service-learning projects which produc[ed] "positive learning outcomes such as improving student

motivation in learning, increasing awareness of their roles as engineers and their contributions to the society." Regarding EWB-USA, Jaeger and LaRochelle[xi] point out that "Quantifying the benefits of ... involvement can be difficult, but initial findings demonstrate that there are a wide range of benefits to more appropriately justify the work involved in participating. The project-based model of programs like EWB-USA gives students the opportunity to apply many hard skills while also emphasizing the development of soft skills." Bielefeldt and Canney have conducted cross-institutional and longitudinal research of engineering students. One specific aspect of their 2014 survey work focused on the impact of EWB-USA on students' attitudes around social responsibility. In their results, students who had highly active participation with EWB-USA, throught for example, attending in-country visits, "had the highest initial SR and generally maintained this high level."[xii]

Other researchers have pointed out how service learning might also help to diversify engineering education, and, in turn, the engineering profession. For example, Davis and Finelli have identified strategies that are specifically successful for the retention and academic achievements for underrepresented populations in engineering: Engaging in research and in service-learning[xiii]. Farinde et al. found similar positive effect when working with African American and Latino high school students. Their project sought to expose these minority groups to community-based service-learning while hoping to increase their interest in STEM and engineering, in particular. Their study produced impactful qualitative data on the positive effects of the service-learning project.[xiv] And, more generally, Espinosa's research with women of color in STEM found that "community engagement during college and post-college is a stronger priority expressed by many underrepresented student groups."[xv] In sum, then, service-learning has a variety of positive benefits for students and ensuring that all who are interested are able to reap these benefits is important.

METHODOLOGY

Our overall project takes a mixed-methods approach and draws on several sources of data[xvi]. EWB-USA shared project documents with our team (over 6000 documents representing approximately 500-600 projects). University of Wisconsin-Stout student research assistants cataloged these files, noting the type of chapter (professional or student) and the chapter's location, the type of project, the documents that existed, and the dates the documents covered. From there, we carefully chose thirty projects to reflect a variety of project types, EWB-USA chapters, and geographic areas. We chose a mixture of water, sanitation, and other infrastructure projects in rough proportion to these types of projects overall. Projects in different geographic areas were also chosen, again, in roughly the same proportions as the areas in which EWB-USA projects are conducted. Finally, we chose a mix of institutions—large public universities, elite private colleges, and smaller institutions. Our choices within these parameters were random (that is, we did not look into the details of the projects and pick particularly successful or unsuccessful projects). In two cases, a project was chosen because we also had interview data collected from members. We are currently completing the process of analyzing these documents, writing up case-studies of each and coding documents for themes using the qualitative data analysis software NVivo.

We have also conducted interviews or focus groups with a total of 42 students, 12 faculty, and 12 professional volunteers or mentors involved in EWB-USA. In addition, we have interviewed faculty who have done other types of service-learning projects. Most participants were recruited from EWB-USA and ASEE Conference attendees. Email invitations were sent to all attendees at EWB-USA events; for the ASEE conference, specific society divisions were asked to send a request through their email lists. The only exceptions to this process were interviews conducted with the chapter we traveled with. Interview questions covered a range of issues including how the participant came to be involved in EWB-USA, what their participation has included, what they have learned or gained from their participation, if their participation has impacted their engineering identity or career path, how they were able to fit their work into their lives, and how they think about the ethics of doing their work. Interviews were conducted during these

conferences, during travel, and, in one case, via phone. Due to time constraints during conferences, some focus groups were conducted. At other times, one-on-one interviews were possible. All interviews were recorded and transcribed, with data coding underway through Nvivo.

Originally, the ethnographic component of our project was envisioned as following one chapter through an entire project cycle. We planned to travel with a particular EWB-USA project team, sit in on community conversations, and conduct participation observation in chapter meetings, work, and planning sessions. The chapter identified for this portion has, for a variety of reasons, not been able to make progress on their project, but we were able to find another chapter to travel with. However, we have not been able to conduct participant observation during ongoing chapter activities due to geographical distance. Instead, ongoing check-ins with chapter leadership have been conducted. Dr. Tina Lee and student research assistants traveled with the chapter (described in more detail below) to a county in Latin America twice. On each trip, we observed all activities undertaken by the team (splitting up to make sure as much as possible was covered), interviewed all members of the team, and assisted with project tasks including translation, the construction and administering of a house-to-house survey and a physical survey to collect assessment data for the team's next projects, and basic construction tasks (moving rocks for the foundation of the sedimentation tank and helping to grade a road to move construction equipment). In addition, we had informal conversations about the work that was occurring and how the chapter is run. Extensive fieldnotes were taken to record these experiences and interactions.

Finally, and in addition to these qualitative sources of data, we have collected survey data from engineering students in a core engineering class and from a comparison group of students in other majors at UW-Stout.

CASE STUDY ONE: LARGE MIDWESTERN PUBLIC UNIVERSITY

This student chapter is at a large university with an overall enrollment of around 30,000 undergraduate students and one of the largest engineering programs in the county (total enrollment of around 4800 students)[xvii]. It has a large membership of committed students and is currently engaged in four programs in four countries in Africa, Latin America, and the Caribbean. One of the authors has conducted participant observation with the team working on one of the Latin American programs which has worked for the last several years to provide access to clean water to two small communities of a few hundred residents each. Her fieldwork included two trips to observe project work, attending some team meetings, and interviewing all travel team members. The first trip was an implementation trip to complete work in the first community and the second was an assessment trip for the second community. Traveling with the group allowed her to observe how projects are conducted and provided numerous opportunities for informal conversations about how students became involved and their backgrounds, motivations, and lives.

The program runs smoothly. The team is able to make regular trips to the community, to complete all necessary paperwork (which is substantial), to plan their work effectively, and to deal with setbacks and unforeseen circumstances. Having a large membership means that work can be completed efficiently, and students can contribute as their skills and preparation permits. There are enough students to take on less glamourous tasks and not all students are able to travel for all in-country work. Travel is a major motivator for many students and treated by the team somewhat as a reward. There is an application process to choose the travel team and it is made clear to everyone that those who are heavily involved in other areas are prioritized when choosing travel team members.

The chapter has been able to draw in students who bring a variety of skills beyond their engineering training—organizing, team building, Spanish language fluency, etc. The chapter has been successful in fundraising, including grant writing, which helps facilitate their work. They are able to recruit enough student leaders so that there is a smooth succession plan. Newer students (either new to the chapter or who are early in their college careers) are recruited and given tasks so that they can learn and grow into taking on more

complicated tasks or leadership roles. The team is thoughtful about having a mix of students travel and giving students opportunities to learn more about the project over time. Students might be specifically chosen to travel, for example, in their first or second year so that they can eventually take over leadership as more senior-level students graduate and move on. Their processes are certainly not perfect, and not all students agreed that they were given the opportunity to grow into more substantial roles. Some complained that they were not able to see the bigger picture and were unsure how they fit into the larger whole. Nevertheless, the team has not faced the problem, common to many student organizations, of ebbs and flows of participation when students come into and leave the organization.

Part of the reason for these successes is certainly the overall size of the engineering school. There is a large pool of students to recruit from and the chapter is tied to a local professional chapter that can provide mentoring. The chapter has also been able to fundraise and is regularly supported by a local engineering firm which has enabled the team to take on ambitious projects. At the same time, it is apparent that their success is not only about the absolute number of students involved. The students involved are all privileged in many ways, and these advantages allow them to commit to this work. Students had a variety of resources that allowed them to fit this work in with a rigorous and demanding program of study: high academic preparation, family support, money, time, and cultural capital.

Fully participating in an EWB-USA chapter is costly in both time and money. Although we do not have data about all chapter members, and there are certainly some who are less involved and might come from substantially different circumstances, those who are heavily involved come from educated families with a myriad of resources, grew up in relatively wealthy suburbs, and received excellent high school educations. They were all able to devote time to this work and did not have to spend substantial time in paid employment. Many were either supported by their parents or were comfortable relying on loans to pay for school and were thus not working to afford school. I only heard one student talk about having a part time job that took a substantial amount of time, and this seemed to be related to having a somewhat strained relationship with their parents. Not having to worry about affording college enabled them to put in substantial amounts of time in this extracurricular activity.

Many of these students also had time in their schedules because they were very well-prepared for their engineering curriculum. Many of them entered college with substantial numbers of Advanced Placement (AP) credits (including in math and science) and were able to efficiently complete course work due to their skills and knowledge. Most of them have educated parents as well, and several had parents who worked in engineering or other technical occupations (computer science, medicine, etc.). They all talked about ways that their parents were involved in their lives and educations and were extremely supportive of their activities.

Despite fundraising success, students are also responsible for contributing financially to the project. Students must be able to contribute a substantial amount towards travel costs ($750 for the trips we observed) and must be able to pay for other items such as passports, visits to doctors for needed vaccines and travel medicines, and gear for the trip (travel backpacks, hiking boots, appropriate outdoor clothing). The researcher, for example, spent several hundred dollars buying gear to make the trip possible and more pleasant. Most of the students had items from previous family trips or school activities like scouting but others were able to rely on parents to help in this area.

Finally, students have other forms of knowledge and cultural capital that make participation possible. Most of them were experienced travelers and talked a lot among themselves about previous trips and experiences. Many had traveled abroad as children and youth with their families and were able to easily and comfortably navigate traveling. Many of them had access to foreign language instruction and were able to converse at least a little in Spanish. Overall, few seemed to be outside their “comfort zones.”

All of this was in direct contrast to Dr. Lee’s own undergraduate research assistants who participated in the observation trips. Neither had been outside the country before and had far less experience with travel. They both expressed feeling that the trip was a good experience but that they were far outside their comfort zone. They had little in common with their peers, in part due to differences in campus cultures and majors,

but also because they did not come from wealthy families and could not easily relate to each other's lives and find common ground.

CASE STUDY TWO: SMALLER MIDWESTERN REGIONAL UNIVERSITY

In contrast to the school above, this chapter has struggled to get off the ground and was unable to complete its first project. This school is much smaller, with an overall enrollment of around 9,500 students and an engineering school with an overall enrollment of close to 1,100 students (including students in the closely related technology programs). Insights into this chapter's activities and operations was gained through interviews and discussions with chapter leaders and membership as well as through project reports and outcomes.

The chapter began in 2014 and took on a clean water project in Latin America. Only a handful of students have been involved at any given time, and they had little time to devote to the project due to family and work commitments. The chapter was able to make one trip to the community to conduct a needs assessment in 2015. When the chapter traveled for the assessment trip, they had difficulty recruiting enough students interested in travel primarily due to apprehension about travelling outside of the country and limited ability to contribute needed resources such as equipment and financial contributions towards travel expenses. Ultimately, three students were able to travel in addition to the faculty mentor and professional mentor. After this trip, the group faced a variety of delays in completing necessary tasks (paper work and designs) and were unable to adequately fundraise to meet project expenses in a timely fashion. These delays, again, were related to the lack of time students had in their schedules. The community expressed frustration with the delays and long timeline and eventually decided to look elsewhere for help.

In terms of delays in completing tasks, this result was also, in part, due to difficulty the chapter faced in identifying local, professional mentorship due to the small size of the local community and lack of a regional professional EWB-USA chapter that isn't already encumbered with other university affiliations. The professional mentor that travelled with the team in 2015 was serving in a temporary capacity and was not available to continue with the project. Since that time, the chapter has connected with project mentors from across the country who have attempted to provide professional assistance remotely, but this has proven difficult when faced with solving challenging engineering tasks collaboratively over a video call. In our review of other chapters, we saw that these challenges are not unique. Copeland and Yip-Hoi, for example, shared many of the same problems in terms of chapter continuity, securing mentors and working with small teams as problematic.[xviii] Additionally, the chapter has also discovered difficulty in raising funds within their local community. The potential donors (individuals and businesses) preferred to support activities which had more direct local impact. The group ran several fundraising events to limited success, often raising only a few hundred dollars at a time and ultimately falling short of the funds needed to support anticipated project costs. Because it is situated in a small university in a small town, this chapter lacks the fundraising potential of chapters in large cities with more firms and larger alumni bases.

The overall smaller number of students at the University makes recruiting for the organization difficult, but there are successful chapters at much smaller schools who have been able to successfully run EWB-USA programs. To take just one example, a small liberal arts college in the west with a total enrollment of 1,400 students currently has 4 ongoing programs in 4 countries in Africa, Latin America, and the Caribbean. Rather than being explained only by numbers, then, a key factor is that there are far fewer students with the privileges and resources to make participation possible and practical. This school has a high percentage, around 40%, of students who are first-generation, from low-income families, or both. In the engineering majors, 36.2% are first generation, 19.6% are low income, and 11% are both.

Part of the reason this school attracts more low-income and first-generation students is its career focus and marketing campaigns that highlight job placement rates. In many ways, the school is attractive to students and families who view it as a good investment. The campus climate also focuses on activities that are directly

tied to future employment (internship and co-ops are required in many programs including all engineering and technology programs), and this makes participation in extracurricular activities particularly challenging for some students who struggle to find time for them alongside long hours working to afford school and meet graduation requirements. Further, due to having an over-full curriculum with little flexibility and a lack of prior university credits, for many students there is simply not enough time and few resources to focus on extracurricular activities such as EWB-USA. Similarly, during the Summer break between terms when many EWB-USA chapters are travelling to visit their project sites, the students we spoke with reported that they are unable to travel during this time because they need to work Summer jobs and participate in internships in order to be able to afford their education and meet program requirements.

Overall, then, this chapter faced a lack of resources (time and money) and this was, in turn, related to the fact that the students come from less privileged backgrounds. The university's focus on paid employment through its marketing and curriculum initiatives also played a role as did its location in a small town far from EWB professional chapters with time to devote to mentoring.

DISCUSSION AND IMPLICATIONS

These two chapters and their experiences certainly do not represent the entire range of EWB-USA chapters but, judging by our interviews with a range of highly involved EWB-USA members in other chapters, these patterns seem common. Many of the individuals we interviewed mentioned the privileges they grew up with (without us asking about this issue) and their desire to "give back" and make a difference. For example, one student member we interviewed, when asked what EWB-USA has meant to her and why she first got involved said:

> "I've lived in pretty affluent areas my entire life. Very, bubble, I like to call it my bubble of the self, and engineers without borders gave me the opportunity to step out of that bubble. Now the place that I live in in Georgia actually. That area is one of the most affluent areas, within Georgia. Um, our income is the reason the city of Atlanta is not completely in poverty… But I've lived in that bubble and, the students I went to high school with were, you know, half of them came to Georgia Tech with me, my incoming class so, it's a very little and narrow view that I basically brought up in."

Many other mentioned that parents and teachers encouraged them to become involved and mentioned that their parents are college-educated professionals. Some specifically mentioned the opportunities at their high schools and the travel and other opportunities they were able to take advantage of.

Other participants have also mentioned the costs associated with travel and the amount of time it takes to be able to participate in a meaningful way in these projects. In examining a sample of project documents from a range of student chapters, it becomes clear that projects are costly, and not all chapters are able to raise enough money to cover all costs. In our sample, travel costs alone ranged from $5400 to $16700 with an average of $9200. Budgets note when costs are covered by grants and other sources, and many of those we examined state that funds to cover costs had not been secured. These documents do not mention whether individual members pitch in to cover these costs, but we suspect this is common, and certainly not possible for all members. Although members can certainly participate without traveling, travel is a big selling point and a motivation for participation among most of the members we have interviewed. Travel is also noted by many members as being particularly transformative in terms of learning about cultural difference and global processes. Thus, it is something that should be supported for those students who cannot afford it.

In addition to these issues related to the resources that privileged students have access to that other students do not, there are also issues surrounding university characteristics. Smaller universities, programs that focus on encouraging paid industry experiences, and universities without a large pool of alumni and local firms to approach to help fund projects also make running a successful chapter more difficult. Universities in cities

that are near vibrant professional chapters will also be more successful since they can draw on a larger pool of qualified professional mentors. These universities should perhaps consider allowing more service-learning projects to count for graduation requirements, but these projects will need far more institutional support to make this a more viable option that allows students to get the depth of experience needed.

That not all students are able to equally participate in EWB-USA projects is perhaps not surprising, but it is concerning. Certainly not all students will be interested in participating in these activities, but the positive outcomes are clear, and thus it is important to take steps to lower barriers to participation when possible. When engineering schools use EWB-USA participation as a marketing tool, and especially when it is cited as one way that students meet ABET accreditation outcomes, they should take steps to ensure that all students who want to participate are able to do so. Providing scholarships for students to cover costs associated with participation and perhaps making course credit available so that students have more time would be good first steps. We agree with Jaeger and LaRochelle who note that the efficacy of service-learning and EWB-USA experiences "provide a motivation for engineering schools to better incorporate, to more readily offer, and to justify the expense of incorporating international development projects into their curriculum."[xi] Diversifying participation in service-learning can also, perhaps, help better retain more female and underrepresented students which can help make the profession more diverse, an important goal. Moreover, "Innovations designed to help female students and underrepresented students of color actually [benefit] all students."**Error! Bookmark not defined.** Having diverse service-learning teams will benefit all involved as it provides another way for students to learn respect for cultural diversity, how to work across differences, and how to effectively incorporate different views into their work.

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