

Exploring, Documenting, and Improving Humanitarian Service Learning through Engineers Without Borders U.S.A.

Dr. Tina Lee, Dr. Devin Berg, and Dr. Elizabeth Buchanan; University of Wisconsin Stout

Introduction and Background

- A four-year, National Science Foundation funded study of service learning in undergraduate engineering education, specifically focused on Engineers Without Borders (EWB).
- Investigating a variety of chapters and projects to identify best practices to meet the needs of all stakeholders: students, faculty, professional mentors, and communities who benefit from EWB projects.
- EWB Background:
 - Founded in 2002
 - Almost 300 Chapters, about 16,800 Volunteers
 - Student and professional chapters work with in-country Partners in 45 Countries
 - Typical Projects: Clean water, Sanitation, Energy, Agriculture, Civil Work and Structures.



Research Questions

1. Does participation in service learning such as EWB contribute to a culture of ethical STEM practice? Do participants from service learning projects experience their STEM education in a qualitatively different way than those who do not?
2. How can we learn from the on-ground experiences of students and faculty to identify and promote best practices in humanitarian SL for a more ethically aware STEM culture?
 - A. How does participation in SL "fit" into the typical practices of undergraduates?
 - B. If students are not able to experience a project from inception to conclusion, are their experiences less meaningful? What are the professional responsibilities that students miss by participating in only some segments of a project?
 - C. How can institutions encourage meaningful participation for faculty and students? What are the short and long-term effects of participation?
 - D. How do we ensure is driven by an ethical imperative and is a sustainable benefit for the communities served?
 - E. What institutional constraints face both faculty and student participants in EWB-USA chapters? What strategies can we develop to minimize these?
3. Who is the primary client or beneficiary of SL? What is the balance between helping a community versus or contrasted to student experiences?

Methods and Data Collection to Date

Mixed methods study combining surveys, interviews, focus groups, participant observation, and coding of EWB project files.

- Sample EWB projects representing types of projects and institutions, as well as the distribution of projects globally, coded for themes surrounding project success and challenges.
- Pre- and post-surveys of students in ETECH 100: Impacts of Engineering over 3 semesters
- Surveys with a control group of non-engineering students
- 20 one-on-one interviews with EWB participants
- 15 EWB participants in several focus group meetings
- Participant observation during an implementation/assessment trip to Ecuador



Preliminary Results

In-country Partnerships

- **Key given short trips:**

"One of the major families in the community...didn't get along for some reason with this other family and they don't talk to each other, and I didn't even know this, [until] 3 months into [a separate semester long] trip [without the chapter]. And so, that just kind of hit me, **like we don't really know anything**... So, we do really rely on context in the community, people who speak English and work with us."
- **Can hinder project success:**

"Our NGO is kind of a source of controversy in the community...half the community doesn't like the NGO and half does. So that's a source of conflict, and its really hard to really get to know the community... **We actually stopped implementation of our project...[to] figure out their true needs**... Our NGO wouldn't let us have focus groups with the men in the village...but we were able to talk to the women... It was very interesting hearing their perspectives verses the NGOs, realizing that even though... we have a good connection with our NGO, **all our information [came] through the NGO [and] we aren't able to have a good connection with community as a whole because of how they view the NGO**. And that's something to be very aware of.

Results (continued)

Ethics and Cultural Awareness

Not saviors or tourists:

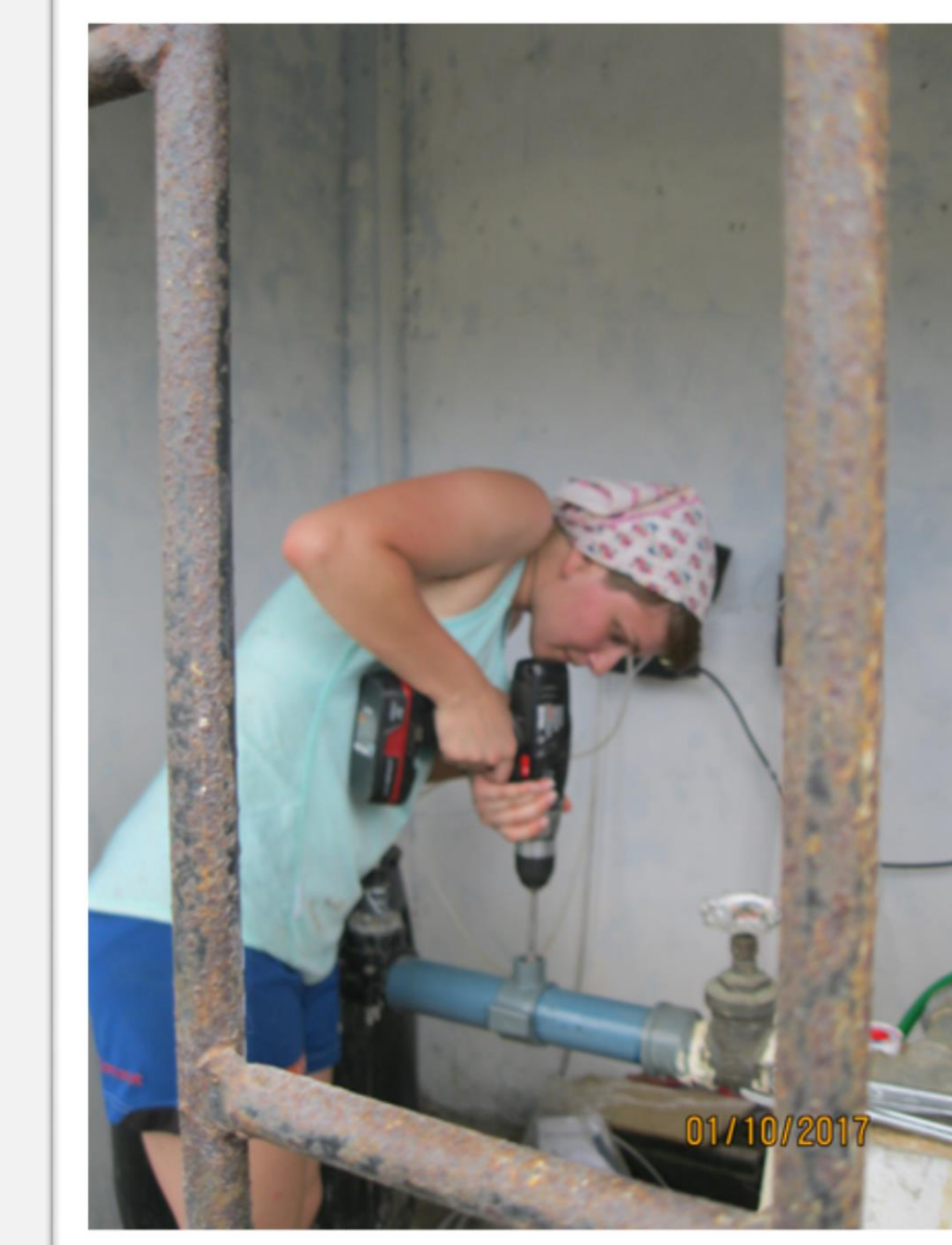
"We don't want to see it as 'we're saving people,' and I try to consciously think about how **they have their own culture, they are independent people**... We are there to help them, but I totally get more out of it than, I think, we provide them... When we have travel meetings...we generally discuss cultural things...and I think people are aware of more and more about [things] like, taking pictures with random kids, and posting them to Facebook is kind of weird..." –Student Member

Work WITH Communities:

"We do work with the communities and try to get their input...it's very conscious, **you have to continually think about doing it**. And you can't get lazy and be like; oh, well, we came up with a design, this is the best design for you guys, lets install it. There is always room for improvement." –Student Member

Reflection is Important:

"We need to approach our projects so that we're collecting data and figuring out what's going wrong and fixing it...**instead of just going there and doing things that like make us feel good inside**... I've really appreciated that about EWB...they haven't disregarded this fact that there's a lot of improvements to be made... I've thought a lot about that and carried it with everything I do... being able to kind of monitor yourself and what you're doing... as well as trying to create that **cyclical feedback loop** so that you're getting better." –Student Member



Gender

"I think some of what scares a lot of women away from engineering is just, sophomore year, junior year, it's all so....do these problems, you have no context, it's just go thought the math of it. And with EWB you really incorporate the whole system, the whole process of engineering, and you do have a real impact on people, and... **women like to have that connection to people, and I think it's really obvious, when you go into a room and you're like, wow there's women here**. (Laughs) So yeah, it's great having it almost 50/50; it's also like really weird at first because you are used to being the only women in a discussion section, or like one of ten in a class... **I would have quit engineering years ago, if it wasn't for EWB**." –Student Member [She is now attending graduate school.]