



Engagement in Practice: Model for Project-Based Community Engagement [Central American NGO] Case Study

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Abstract

The landscape of community-engaged engineering and design is evolving as many global communities have experienced infrastructure development in recent decades, climate change and local crises impact peoples' environments, and calls grow for more community-led participatory development. Through its years in operation, Engineers Without Borders (EWB) Guatemala has developed approaches for addressing these challenges in their programs, but found a need for a tool to evaluate, communicate, and more effectively implement them with their stakeholders. A Model for Project-Based Community Engagement was developed to facilitate reflection on program design, development, and analysis in just such cases. This recently-created model was applied by EWB Guatemala staff in their work and is presented as a case study here for how the model can be applied. The model is shown to provide an effective framework for reflection on the program's structures, and the organization plans to further utilize it going forward.

Introduction

Community-engaged learning, also known as service-learning, strives to incorporate service to meet community needs, academic connection to course material, reciprocal relationships and mutual learning between all stakeholders, and intentional reflection [1]. Within engineering, the pedagogy has been found to be effective in supporting student's development of core professional competencies [2,3] as well as in serving as a recruitment and retention tool for the profession among diverse populations [4,5]. Engineering community engagement is often used in project-based design experiences where there is a project deliverable. Both the project and the engagement process generate and redistribute value and resources to and from the stakeholders. The deliverable may be a physical artifact, documented design, software program, or process plan, while the process includes all the activities and relationships experienced throughout the project. A model was developed to facilitate reflection and discussion on project-based community engagement program design, development, and assessment, driving intentional consideration, definition, and organization of stakeholders, project deliverables, project process, resources input, and value produced [6]. Such tools are relevant today, as the MIT report *The Global State of the Art in Engineering Education* notes that future innovations are likely to come from "how programs are managed, structured and delivered in practice" [7]. A prior paper demonstrated the use of the model with two engagement programs in the U.S. [8] This paper provides insights applying the model to a case study for a program from Central America. It is intended to serve as an example that others may learn from and be inspired by as they consider applying the model within their own work.

Background: Project-Based Community Engagement Model

The model [6] shown in Figure 1 supports the challenging task of balancing the many aspects and interconnections of high-impact project-based community engagement. Many previous models [9,10] used in community engagement do not explicitly include considerations of a project deliverable, which is often a meaningful component of community-engaged engineering. One intent of this model's design is to acknowledge the importance of the engineering project's deliverable while also expanding the user's view outward to include the process elements. As

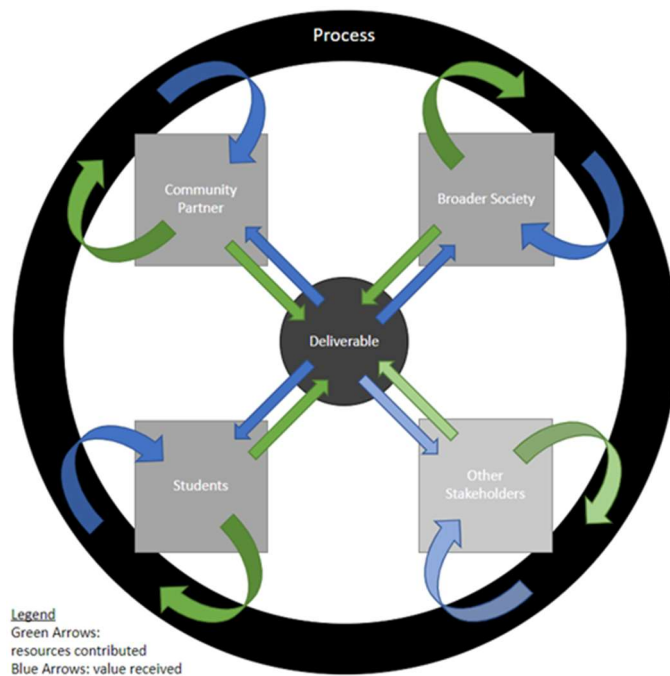


Figure 1 Project-Based Community Engagement Model [6]

such, the project deliverable is shown in the center, but this is not meant to indicate an increased value of this element. The project process is represented by the outer circle, binding the stakeholders together, as it creates shared experiences, communication, and relationships. The process includes everything that happens during the experiences, activities, and partnership that are not the deliverable, bounding the scope of the project. The stakeholders explicitly considered as part of the partnership are shown as gray boxes within and overlapping the circle. Three common stakeholders and a placeholder for other stakeholders are listed in the circle but should be edited or added to in order to represent those involved in the program or project under review. Resources contributed by that stakeholder are illustrated by the arrows moving away from the stakeholders,

while the arrows moving into the stakeholder boxes represent value received by that stakeholder. For the project deliverable, resources and value tend to act more transactionally in a specific direction; on the other hand, the project process involves more continuous give and take. Therefore, the arrows to and from the project deliverable are shown as straight lines and those between stakeholders and project process are shown as more circular.

Case Examined

One example of a community engagement organization is Engineers Without Borders (EWB) Guatemala, which is the context for this case study. EWB Guatemala was founded in 2016 as an offshoot of EWB-USA, the largest community-engaged engineering education organization in the United States, but has since evolved into an independent non-profit which works with a number of partners in addition to EWB-USA. It has 15 permanent staff across three offices throughout the portions of the country where it focuses on implementing projects. The team is currently coordinating approximately 75 active projects and partnering with over 40 student or professional chapters of EWB-USA. EWB Guatemala's programs primarily focus on civil infrastructure design and construction within their areas of expertise in water supply, bridge, and school building projects. These projects engage a wide set of stakeholders and seek to balance the interests of multiple partners.

Since its inception, members of EWB Guatemala have observed and adapted to a number of significant shifts in the context of their work. Many global communities in low- and middle-income countries, including Guatemala, have experienced infrastructure development in recent decades. This means that relatively simple projects such as those that involved a short gravity water conduction line over smooth terrain from a serviceable and uncontaminated spring source

within the community have largely been completed, leaving communities with more expansive infrastructure needs requiring more complex and often expensive solutions. Climate change and local crises have also added to the complexity of unmet needs and the range of potential solutions. Furthermore, rather than simply sending students from the U.S. into communities with limited physical infrastructure, there is a growing call for more community-led, decolonized, and participatory development which acknowledges the increased technical capacity in the countries where these communities are located. All of these factors have led the community partnership requests EWB Guatemala receives to including more technically and organizationally complex design situations. Over its six years of operations, EWB Guatemala has developed ways of working with EWB-USA chapters and other partners that allows them to address these challenges effectively, but found a need for a tool to evaluate, communicate, and more effectively implement them with their stakeholders. The use of the model by the EWB Guatemala staff as documented in this case study was the response to this need.

Results

Implementing the model by creating a table to identify stakeholders, resources contributed, and value received was straight-forward, taking several hours over a few weeks, with two meetings. The first meeting included a handful of EWB Guatemala staff and one of the developers of the model. In this conversation, the group reviewed the model and corresponding data table format together, proceeding to fill in a few cells of the table to understand the process and bring forward and resolve any questions. Following this, the staff members communicated with no further input from the model developer to craft the results shown in Table 1 below. This was done by considering representative projects over the range of project types EWB Guatemala works on. The case study deliberately pushed the boundary of what was published previously by splitting out deliverable and process to provide a further refined and detailed view of the program. From this experience, the EWB Guatemala staff identified the three following take-aways.

Lesson 1: Need for increased involvement from local stakeholders. As social, cultural, economic, environmental, and cultural contexts of their projects become more complex, this increases the importance of including additional local partner groups, such as municipal and national governments. The staff has also found it essential to directly collaborate with not only the main community-based organization (CBO) responsible for shepherding the project at hand, but also with other CBOs and the community members at large. Communities are not monoliths and gathering diverse perspectives is key at every level to the design, implementation, and operation processes. It was also highlighted that local technical expertise is important; from commonly available materials and construction practices to understandings of regional geotechnical characteristics, contextual knowledge can be vital to project success in its setting.

Lesson 2: Professional-quality project standards are more important than ever, both in the deliverable and the project process. As additional stakeholders and contributors join in project partnerships and their infrastructure projects become more complex, the EWB Guatemala team has found that expectations and demands to meet commitments only grow. To adequately adapt to these increasing requirements, they believe core tactics should include professional-grade project management throughout the lifecycle and gathering expanded technical expertise. In some cases, this will require shifting the workload for these tasks to a different and/or wider set of stakeholders.

Table 1
Results from EWB Guatemala Program Reflection Exercise Using Model

Stakeholder	Resources Provided		Value Gained	
	Deliverable	Process	Deliverable	Process
Community	Volunteer labor Materials Land	Participation in surveys Participation in defining problem Participation in training Participation in defining solution	Functioning project (specific value depends on type) Dignity of community	Strengthened intra-community working dynamic Strengthened sense of community
Community-Based Organization (committees)	Input to Operation and Maintenance (O&M) plan O&M work	Organize volunteer labor Collects funds for community contribution Mediators between EWB and community at large Organize community meetings Maintain community interest and commitment Signed agreements	Boost to reputation/trust	Work better together as committee Technical and administrative knowledge
Students	Funds Design Other reports and plans Technical O&M orientation/plan	Design labor Project Management Signed agreements	Satisfaction of helping the community	Professional experience Cultural experience Resume boost
Professional Members	Funds Design Other reports and plans Technical O&M orientation/plan	Design labor Technical expertise In-country expertise Project management Signed agreements	Satisfaction of helping the community	Professional experience Cultural experience
Mentor(s)		Technical expertise In-country expertise Project management	Satisfaction of helping the community	Satisfaction of helping students and young professionals
Local Government	Materials Equipment	Help define problem Advocate for EWB policies Signed agreements Studies Permits	Improved relationship with community Fulfillment of development priorities Increased impact of money invested	Improved relationship with community

Table 1 (Cont')
Results from EWB Guatemala Program Reflection Exercise Using Model

Stakeholder	Resources Provided		Value Gained	
	Deliverable	Process	Deliverable	Process
Gov Ministries (by project type)	Ongoing O&M support	Permits Information Design standards	Functioning project Fulfillment of development priorities	
Donors	Funding	Funding References to other donors or supporters	Fulfillment of development priorities Recognition of social and philanthropic work	Recognition of social and philanthropic work
Local NGOs (contract)	Construction labor	Coordination with local stakeholders (community, government, suppliers) Local expertise	Fulfillment of development priorities Improved reputation	Income Improved relationships with local stakeholders Experience and knowledge
Local NGOs (partner)	Funding	Training	Fulfillment of development priorities Improved reputation	Recognition of ability to "join forces" and leverage resources for a larger result
Guatemala Staff	Construction labor Engineering supervision Procurement	Coordination with all stakeholders Technical expertise Project management In-country expertise Design standards and policies	Fulfillment of development priorities Improved reputation	Income Experience and knowledge Improved relationships and growth in network
International Community Program (ICP) Reviewers	Design approval	Technical expertise In-country expertise	Satisfaction of helping the community	Satisfaction of helping students and young professionals
EWB-USA Staff		Chapter eligibility review	Communication materials and reporting	Volunteer engagement
Contractors and Suppliers	Construction labor Engineering supervision Materials Construction equipment	Technical studies Material information	Income	Income
Cooks and Translators	Support to chapter and field staff	Support to chapter and field staff	Income	Income

Lesson 3: No two projects or chapters are the same. Related to and expanding on the lesson above, the members of any particular EWB chapter will have varying levels of technical expertise, project management capabilities, and fundraising capacity. Given this variation, it is critical that chapters work closely with EWB Guatemala to build partnerships with other stakeholders to complement their profile of strengths and weaknesses. Only with the appropriate mix of people who share mutual trust and respect can a project be successful.

Discussion and Conclusions

The goal of the model is to provide a framework and communication vehicle to explore the aspects of effective project-based engagement, partnerships, and learning. Overall, the EWB Guatemala staff reported finding it successful in achieving this aim. The model provided an effective framework for reflection on the program's structures, offering opportunities to explicitly define stakeholders as well as to highlight and discuss both the recourses provided and the value gained by each of the various stakeholders. Through this experience, it was reinforced that both the project deliverable and project process are critical to the successful functioning of such a project-based community engagement program. The model did not necessarily bring new ideas into being but the framework made issues visible and the resulting discussions brought an increase in intentionality to the program design. The reflections provided opportunities for the participants to share and build more of a common vision of the program and its direction. Building on previous case studies, this extends a pattern showing the model may be viable for use with a wide range of programs.

Moving forward, EWB Guatemala plans to continue using the model as part of ongoing strategic planning and evaluation initiatives as well as in communications with their stakeholders. This includes creating new communication materials for various constituency groups based on lessons from the model and using the reflection process to help determine approaches to partnership structures for individual projects with different chapters. Future work in scholarship should include utilizing the model in new ways, testing the model in additional community engagement programs and settings, and developing support materials to increase its effectiveness and impact.

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