Engagement in Practice: Project-Based Community Engagement Model Preliminary Case Studies

Paul A. Leidig P.E., Purdue University at West Lafayette

Paul A. Leidig is a PhD student in Engineering Education and a member of the instructional team for the Engineering Projects In Community Service (EPICS) program at Purdue University in West Lafayette, Indiana. He received his Bachelors of Science in Architectural Engineering from the Milwaukee School of Engineering and Masters of Science in Civil Engineering from the University of Illinois at Urbana-Champaign. Mr. Leidig is licensed as a Professional Engineer in the state of Colorado and has six years of industry experience in structural engineering consulting. Throughout his student and professional activities, he has focused on community-engaged engineering and design for over thirteen years.

Dr. William "Bill" C. Oakes, Purdue University at West Lafayette

William (Bill) Oakes is a 150th Anniversary Professor, the Director of the EPICS Program and one of the founding faculty members of the School of Engineering Education at Purdue University. He has held courtesy appointments in Mechanical, Environmental and Ecological Engineering as well as Curriculum and Instruction in the College of Education. He is a registered professional engineer and on the NSPE board for Professional Engineers in Higher Education. He has been active in ASEE serving in the FPD, CIP and ERM. He is the past chair of the IN/IL section. He is a fellow of the Teaching Academy and listed in the Book of Great Teachers at Purdue University. He was the first engineering faculty member to receive the national Campus Compact Thomas Ehrlich Faculty Award for Service-Learning. He was a co-recipient of the National Academy of Engineering's Bernard Gordon Prize for Innovation in Engineering and Technology Education and the recipient of the National Society of Professional Engineers' Educational Excellence Award and the ASEE Chester Carlson Award. He is a fellow of the American Society for Engineering Education and the National Society of Professional Engineers.

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Abstract

Engineering engagement is typically project-based, which introduces elements and considerations not explicitly covered by models commonly used in service-learning and community-engaged learning. A model specifically for project-based community engagement was recently developed to facilitate reflection on program design, development, and analysis. Two cases are examined using this model as test examples of how it can be operationalized across diverse programs. The application of the model offered opportunities to explicitly define stakeholders as well as to illuminate and discuss both the recourses provided and the value gained by each of the various stakeholders through the engagement project deliverables and process.

Introduction

Community-engaged learning or service-learning is the integration of academic learning with work that supports the greater good within local or global communities in order to enhance the academic learning, address needs within the community, and to give students broader learning opportunities about themselves and society at large. Within engineering, the pedagogy is often used in design or project-based experiences where a physical deliverable, software program, design, or plan is produced as a central component of the value for the community partners. This differs from many of the early adopters of service-learning, where the service was typically defined as time spent within the community or in the partner organization [1]. Nearly 90% of the students studied in *Where's the Learning in Service-Learning* [2] were from placement-based approaches. It is not surprising, therefore, that many of the models for community-engaged learning were designed with placement-based approaches in mind. While such models can be useful in engineering, they lack the context of the project experience that adds dimensions not addressed in earlier models. A project deliverable is central to many engineering experiences, while the project process, including activities and relationships, also binds the system and experience together. Both of these generate and redistribute value to the stakeholders from the resources input. A new model has been developed which facilitates reflection on program design, development, and assessment [3]. It drives intentional consideration, definition, and organization of stakeholders, project deliverables, project process, recourses input, and value produced. This paper explores ways in which this new model was applied to two very different cases, focusing on stakeholder, resource, and value identification, as test examples for a subset of how the model could be used across various approaches and programs within engineering education.

Background: The Project-Based Community Engagement Model

The model [3] is shown in Figure 1 with the project deliverable located in the middle not to place more value on the deliverable but in recognition that in many engineering design or project experiences this is made to be the main focus. The model design is to acknowledge the importance of the deliverable and project completion while also expanding the user's view outward to include the process elements. The outer circle represents the project process, which

binds the stakeholders together. In an engagement model that includes reciprocal partnerships, the process creates a shared relationship in the experience and connects the stakeholders. The process includes everything that happens during the experiences, activities, and partnership. It includes the components that are not the deliverable. These can include the relationship building, communication between partners and stakeholders, activities related to the design process, and other items. The process outlines and bounds the scope of the project. The boxes representing the stakeholders inside the circle are those that are explicitly included in the partnerships. Three common stakeholders are listed in the circle but can be edited or added to in order to represent those involved in

Figure 1 Project-Based Community Engagement Model [3]

the program or project. The arrows moving away from the stakeholders represent resources contributed by that stakeholder. The arrows moving into the stakeholder boxes represent value received by that stakeholder. The arrows between stakeholders and project process are shown as more circular because of the continuous give and take from the process. The arrows to and from the project deliverable are shown as straight lines because these are more transactional and have direct connections in a particular direction.
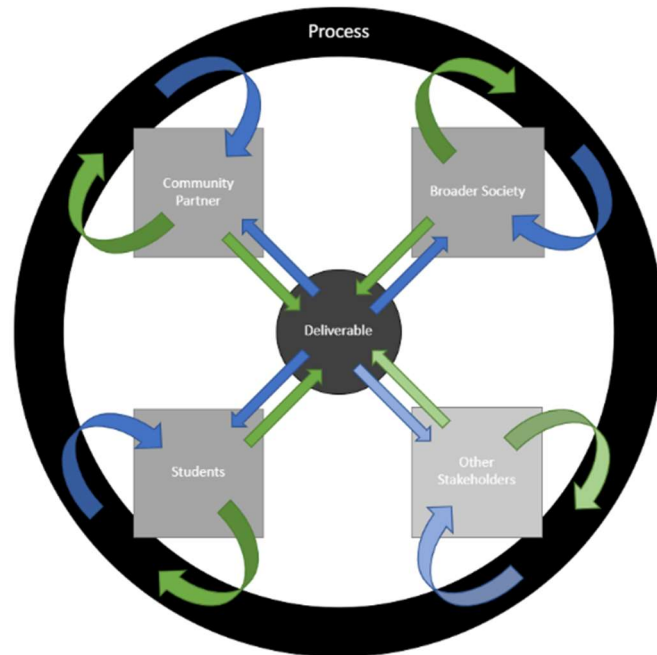
Cases Examined

Two programs from Purdue University are analyzed through the lens of the model. The first is the EPICS Program that engages over 1100 students per year in designs that are delivered to local and global community partners upon completion [4]. The projects vary in complexity and often are developed over multiple years. Students come from different majors and academic years. A common design process is used across the program to provide a framework for the development of the projects. The second program is the IDEAS Learning Community that engages about 25 first-year students yearly in a one-semester partnership with an outreach program from Indianapolis, Indiana which is about an hour from campus. The central class combines career exploration and integration into the university with discussions and experiences around diversity. The engagement with the outreach program provides a context and activities that enhance the learning goals and provides experiences to bring the class together. The deliverables are activities for K12 students both at the outreach center and for an annual visit to campus.

EPICS Results

EPICS is large and complex, with many stakeholders. We first examined the three common stakeholders of students, community partners, and society at large within the model in detail. The program director and the lead author held a reflection session using the model to look at each. We began with the community partners, and the first value identified to be gained by this stakeholder group as the actual delivered project and use of the deliverable. A hallmark of the program is that students work on projects until they can be delivered to their partner. Further benefits for the partners include the long-term commitment; this included support for fielded projects as well as follow-on work that was captured in the long-term partnership tag. Another benefit illuminated was access to university resources, which are often a result of the partnerships and can extend beyond the actual deliverable. These are examples of how thinking through the process as structured by the model helps identify value-adding aspects of the relationship. The resources contributed by the partners include the context for the project, which comes out of the deliverable itself. When we consider the project process, the partners are contributors of resources to the student learning experience. Viewing this modeling activity in the context of holistic project execution, it becomes clear that the model has a potential connection to the program establishing signed Memorandums of Understanding (MOUs) to forge partnerships, which include expectations for the partners and EPICS. The expectations for time, expertise, and more are included in such MOUs and this model brings an approach to identify these and potentially to refine and define what is included in future MOUs.

When looking at the student stakeholder group, it was interesting that there were no values that went to the students that were solely from the project deliverable. The deliverables themselves are valuable in working on the project, but the value generated to the students comes from a combined experience with the deliverable production and the project process, which includes cycles of reflection as well as interacting with instructors, other students, community partners, and other mentors. The students contribute tangible resources with their work, disciplinary expertise, and their own skills and abilities from their diverse backgrounds. They contribute to the project as well as the process. An interesting note is that, when we looked at resources provided, it reminded us that the students' tuition is a significant resource contributed to the process. Without the students, we would not be pursuing these projects.

The broader society analysis was also enlightening, as it brought into focus the long-term benefits that go beyond the completed project. Most of the value generated to society is developed in the process by which the projects are accomplished and results from the development of the students. Broader impacts can also be realized if the project is disseminated beyond the initial deployment, and this may be considered part of the process. Resources drawn from the larger society include taxes for public institutions or grant funds for project work. Taping into the larger community to enhance the process benefits the program.

The model is a valuable tool to define and examine other stakeholders including faculty, university administrators, and donors as well. The reflection experience was a great way to look at how the program uses resources from stakeholders as well as what value they receive. The importance of this can be especially clear as one looks at engaging corporate or other community partners, but it represents a critical consideration when thinking about all stakeholder groups.

Table 1
Results from EPICS Program Reflection Exercise Using Model

Stakeholder	Resources	Value
Community Partner	Time of staff and/or volunteers; Expertise on the context; Problems that motivate the design.	Use of deliverable; Access to expertise; Long term partnership.
Students	Tuition funds; Time and energy; Disciplinary expertise; Diverse expertise from personal backgrounds.	Learning (see course learning outcomes); Bridging experience; Personal/professional community engagement; Experience for finding work; Interaction with diverse stakeholders.
Broader Society & Larger Community	Taxes to public university; Providing capable/experienced people to interact with the program; Links to resources or collaborators.	Graduates more exposed to broad social issues and how they might impact them through civic engagement; Graduates better equipped in disciplinary area and application; Graduates understanding of how disciplinary and design knowledge can impact causes they value through professional engagement; Dissemination of locally created deliverables.
Instructors (Advisors)	Time and expertise; Access to outside recourses and networks; Academic credibility.	Job salary and benefits (unless volunteering); Teaching or service credit; Opportunities to engage with students and the community Personal/professional community engagement; Opportunities for scholarship and broader impacts.
EPICS Program and Support Staff	Organization, facilitation, administration; Fundraising; Academic structure; Community partnership structure.	Job salary and benefits; Success stories; Program recourses and growth; Personal community engagement.
Donors	Funding; In-kind donations; Expertise and engagement with program.	Publicity; Access to and engagement with students; Psychological value from community benefits and high-quality projects; Tax impacts.
University	Allowing course for credit; Funding for service-learning grants; Facilities and personal; Access to recourses and networks.	Promotional materials for recruiting; Increased diversity; Engagement mission; High impact pedagogy; Awards and recognition.
Teaching Assistants	Grading and administration; Help with student learning directly; Time and expertise.	Job Salary and benefits; Community engaged design teaching experience; Personal / professional community engagement.
Engineering College	Allowing for course credit (tech electives, senior design, 1st-year); Laboratory funding; Facilities and personnel technical expertise; Administrative support.	Promotional materials for recruiting; Increased diversity; Provides experiential learning in 1st year to senior design; Broader impacts for research grants; Awards and recognition.

IDEAS Learning Community Results

The IDEAS Learning Community engages about 25 first-year students and is confined to a single semester per project. This course has more emphasis on the process than the EPICS program. Looking at the community partner in the model forced us to consider who that partner really was in that box. IDEAS works with a nonprofit that operates a K12 after-school program. Was the partner the nonprofit or the K12 students? For the exercise, it was determined that the community partner was the nonprofit, adding the K12 students as an additional stakeholder. The deliverable in this case is a set of activities for the K12 students; they are developed through interactions with the K12 students themselves, so the deliverable is interwoven with the process.

The student box was designated for the university students, and the value gained from the deliverable is linked with the process. Having the deliverable provided a context for the learning objectives in the course and a learning experience that can have broad impact. The experience provided a benefit for them in looking for internships or other employment as well. These benefits are linked with the scaffolding of the course, including the regular reflections.

The broader society stakeholder was harder for this program, partially because it is smaller in scope and time. The evaluation was an opportunity to reflect on the process as well as the long-term benefits and impacts of the intellectual and experiential seeds we plant with students and how they may impact the world as they grow into the future. It also offers the opportunity to think of how the work can be expanded or connected to other efforts for increased impact.

The other stakeholders included the K12 students, and the exercise offered an opportunity to consider their perspective, which was valuable. The larger university was also brought into consideration and this is a great reminder of how programs can produce benefit across the institution and towards the larger mission of the university. These benefits need to be made visible to have an impact and the use of the model illuminates them for the team.

Table 2
Results from IDEAS Program Reflection Exercise Using Model

Stakeholder	Resources	Value
Community Partner	Mentors (teachers); Transportation Physical space; K12 students.	Access to university students and recourses; Activities for K12 students; Age-appropriate mentors for K12 students; Exposure to engineering.
(University) Students	Time, energy, and creativity; Ability to connect based on age and relevant experience.	Learning (course outcomes); Interaction with diverse stakeholders; Personal community engagement; Experience for finding work; Building personal 1st-year network.
Broader Society & Larger Community	Individuals to interact with students, materials on diversity/ cross-culture.	Graduates more exposed to broad social issues and how they might impact them through civic engagement; Graduates better equipped in disciplinary area and application; Graduates understanding of how disciplinary and design knowledge can impact causes they value through professional engagement.

Instructors	Time and expertise; Access to facilities.	Personal exploration of diversity; Personal community engagement; Teaching or service credit; Awards and recognition.
K12 Students	Time and energy; Feedback on prototypes.	Exposure to engineering projects; Access to university faculty/staff/students; Connection to age-appropriate role-models.
University & College of Engineering	Funding (transport, food, materials); Facilities; Award programs and recognition.	Recruiting of students; Multi-cultural (diversity) focused 1st year program; Engagement mission; Awards and recognition.

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. The model achieved those goals with the two very different cases presented, suggesting it may be viable for use on a wide range of programs. The reflective modeling process made visible ideas that are part of the programs and provided scaffolding to examine the notions that have guided their development. These included concepts that have driven the use of MOUs, and earlier adoption of this model may have accelerated their development in these cases. The application of the model in these cases was particularly powerful in seeing the perspectives of different stakeholders, offering a lens for intentionally and methodically identifying and considering each one. Of particular interest was the delineation of the direct community partner and society at large. Also noteworthy were the reflection opportunities in both case studies through exploration of the value received and the resources required for each stakeholder connected to either the project deliverable and/or process. Modeling the cases in the time of COVID-19 was especially impactful as we searched for new ways to add value and had to think about how we resourced our programs during the unusual situations of the pandemic. One of the goals of the model is to explore the dimensions of the project deliverable and project process themselves, and the model was very effective for this in both case study settings, where, in each, one element was dominant but both clearly had a role. The modeling process in these cases offered opportunities for explicit reflections and discussions, and it offers a way for program leaders to intentionally plan and execute effective approaches. The model could also be a communication device with current and prospective partners in these programs. While the cases presented are different, they are limited and from one institution. Future work will involve utilizing the model in addental ways, testing the model in other settings, and developing support materials to increase its effectiveness and impact.

References

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