
AC 2012-4493: ALIGNING THE AGENDAS OF THE ACADEMY AND THE COMMUNITY

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Aligning the agendas of the community and the academy

Abstract

This article reports on a series of projects in Providence, Rhode Island inspired by the question, “How can we push change in a more sustainable direction?” During the spring of 2011 two teams of students from an upper level engineering course entitled “Sustainable Energy Technology” worked with community based organizations (CBOs) to identify site-specific energy and material use actions. During the falls of 2010 and 2011 joint Brown University School of Engineering - Rhode Island School of Design Department of Industrial Design studios addressed the question from a product development perspective, again working in partnership with CBOs. Three iterations of a course called “The Craft of Teaching”, offered by the Brown Education Department, asked a similar question in the context of a local underperforming high school.

The projects presented a complex context with many stakeholders and competing agendas. From an educational perspective, we explore whether students gained skill in articulating the rationale for their decision making, whether the experience motivated further study and engagement, and whether any of this transferred to other areas of study. Using information from surveys and interviews, and our experience, we offer some ideas about the environment and the framework necessary to promote these objectives.

Introduction

This paper defines models for partner interactions and explores student experiences in courses having community-based components. We surveyed 90 students who had taken courses in education, engineering, and industrial design with the goal of gauging benefits to learning and changes in attitude towards working in a community as part of a course. We have taught traditional courses in these areas for many semesters and have over the past 10 semesters integrated projects that have the potential to improve some of our learning outcomes while providing a benefit for partners in the community. Reflecting on this process motivated us to seek better ways to describe what was happening and to better understand the impact on students.

All of the problems we face are embedded in a context that determines to a great extent the range of solutions that are possible. Having some skill at assessing a context is an important learning outcome and this skill comes through practice. Dyson puts it this way: “Knowledge is never just knowledge; it is contextual and can never be pursued without regard to context.”¹

So, we ask the community for a place (context) where students can practice this skill; in doing so we run the risk of exploiting the community solely for the benefit of our students. To avoid this inequity we work to identify the assets we have that might be used to augment the capacities of community partners. This aligns with Boyer’s call that “...the academy must become a more vigorous partner in the search for answers to our most pressing social, civic, economic, and

moral problems and must reaffirm its historic commitment to what I have chosen to call, this evening, the scholarship of engagement.”²

Why Community Based Learning

Community Based Learning gives students the opportunity to apply disciplinary knowledge in authentic contexts that can lead to positive learning outcomes for students. Furthermore, because CBL is inherently focused on complex and important social issues, this learning has potential to be socially significant as the problems students grapple with affect us all and address real and pressing needs within society. In the authors’ institutions CBL is certainly not the norm and some colleagues express concern that the work is not rigorous and distracts from content that is our mainstay. However, we believe that CBL is essential to the work of higher education in preparing students to be citizens of the world. A report on undergraduate education from the Dean of the College at Brown University supports this idea: “Real-world experiences anchor intellectual pursuits in practical knowledge and help students develop a greater sense of social and global responsibility, thus preparing them to lead future lives of ‘usefulness and reputation.’”³

We define community based learning (CBL), and its complement on the research side, engaged scholarship, as work that is centered on complex and significant social problems that come to life through engaging with community. As Smith defines the term, “In reality, a truly engaged scholar should be a collaborator whose curiosity and skill allow him or her to observe the problem from multiple individual and systemic dimensions, and whose experience in so doing is merely a tool he or she brings to the collaboration that is used to assist the other collaborators in owning the problem or condition, and in designing and testing a solution to it.”⁴

We believe that CBL provides students with meaningful learning opportunities to contextualize disciplinary knowledge and equips them with critical cognitive and reflective skills. Van de Ven asserts that engaged scholarship, “produces work that is more penetrating and insightful than when scholars or practitioners (or I would argue, students) work on them alone.”⁵ Furthermore, CBL has the potential to build community among students and between the University and community based organizations (CBO) and can inspire students to continue this kind of learning and work during their time in the university and beyond.

Courses

The courses that provide the foundation for this reporting were held in the Brown University School of Engineering, the Brown University Education Department and in the Rhode Island School of Design (RISD) Industrial Design Department. There were a total of six courses (including two offerings of the same course and one group independent study project) offered during the 2010/11 and 2011/12 academic years, which were set in a variety of contexts and addressed a range of problems. Many, but not all of the students had participated in CBL work before enrolling in these courses.

The design courses are typically project based and provide an experiential learning environment. They are extremely hands-on, time-intensive and offer opportunities for feedback, critique and

reflection throughout the semester. Enrollment is typically limited to 15 -20 students to allow time for direct interaction between faculty and students, as well as between the students themselves.

The engineering and education courses fall under the read/lecture/test model. The problem and community based work provides an opportunity to apply course content to a specific context and for students to see that the material might have application to some pressing problems. Class size was larger - 30 (engineering) to 100 (education), shrinking the opportunity for frequent and direct interaction between teacher and student.

For the courses offered through the RISD, time is given to discussion of the problem, group design work, research, meetings with subsets of the entire class, and class discussions or critiques. The primary function of the faculty is to suggest methods of approaching a problem, to give feedback on work, offer clarification of the issues raised by the prompt, and guide students to resources helping to move them forward. Students have a large degree of freedom in how they work and bear substantial responsibility for their success.

The primary goal in the design studios is that students develop a process for defining a problem and developing solutions to that problem. The education and engineering courses have content that needs to be part of what happens, so the problem and community based work reinforces and amplifies the course content, and has the potential to offer unique insights or experiences that course content alone can not.. This illuminates the tension between goals of the community work and the goals of the courses.

Models

The courses used three different models that defined how students interacted with the community:

1. a problem embedded in a specific context; this model gets to the challenges of complexity without formal partner relationships, interactions with community/end users are ad-hoc (partner interactions are theoretical),
2. work on problem defined by partner; this model is centered on an existing relationship and context, requires substantial interaction with community/end user, but not with the partner who defined the problem (partner interactions are indirect),
3. work with partner to define problem; this model brings stakeholders to the table at the beginning of the course to work out a problem statement that will guide semester projects (partner interactions are direct).

The table below lists the courses and gives brief descriptions of their time frame, issues addressed, context, and the model that best describes their interaction with partners.

Course	Semester	Problem	Context	Partner interaction
Industrial Design: Energy Studio	Fall 2010	Design+Engineering influencing behavior change around energy	Research institute (office building)	Direct
Sustainable Energy Technology	Spring 2011	Technical issues in sustainable change	Urban district targeted for redevelopment	Indirect
Industrial Design: Sustainability Indicators	Fall 2011	Design+Engineering promoting sustainable practice	Urban district targeted for redevelopment	Theoretical
The Craft of Teaching & Group Independent Study in Education	Fall 2010 Spring 2011 Fall 2011	Lack of college access counseling; high dropout rate; low percentage going on to post-secondary education support for in-school instruction; supplemental educational programs	Urban, high-poverty K-12 schools	Direct

Discussion of Models : Engineering

Each model had inherent strengths and weaknesses and the choice of which to employ was based (in part) on the particular goals of the course. In the fall 2010 “Energy Studio” design course (direct interaction), one of the explicit goals was to understand the users’ perspective on energy use in a building on campus. Students worked in collaborative teams involving engineering and industrial design to take advantage of and learn from the different skill sets of each, and develop an understanding of energy science, design processes, observational research techniques and methods to evaluate concepts. Students developed an understanding of how the occupants used space and the energy systems relied on, before designing, installing and testing interventions. The underlying premise of the studio asked the students to consider how design and technology could reduce energy usage in homes and workplaces.

The specific office building that served as the context for the work had its own unique set of issues, providing both real world constraints and a set of idiosyncrasies that enriched the students’ understanding of the challenges and relationships between the many problems they were facing. From that understanding students were asked to design and fabricate interventions that encouraged a change in the building occupants’ awareness of energy use. Students devised and administered surveys, conducted interviews, and observed behavior. Common areas in the

building were frequently used as our “classroom” to increase the exposure to the context. Data loggers and the building energy system were used to base a portion of the work on concrete information that either validated or invalidated conjectures and assumptions.

The benefits of this approach included a strong bond between the design studio and the building occupants, which in turn provided significant motivation to produce high quality work that met the needs of the users. That is, the close bond raised the stakes and encouraged well-executed and accessible prototypes.

One of the drawbacks of using this model was that learning the context and defining the problems takes a significant amount of time. With only one semester to get from nothing to a finished prototype, spending the time on defining the problem takes away from time that would be spent designing, building and testing. The pace accelerated to frantic as the end of the semester approached, so there was insufficient time for testing, feedback from users, and reflection.

The spring 2011 “Sustainable Energy Technology” course was an instance of the indirect model. Two teams of students (7 of the 30 students enrolled) worked on projects that had been defined before the start of class and in this case the faculty member in charge acted as proxy for the community partner. The projects (a building scale energy use analysis and a district-wide data collection, aggregation, and analysis) had community based components and aligned with the course goal of students completing a design project that integrated a sustainable energy technology with existing infrastructure (only the students in these community related projects were surveyed.) Both projects were data rich and required that students interact with community members to gather some of the data. During the process students were aware that their final reports would become part of a document that detailed sustainability issues in the district and that this document would receive wide circulation in the community. In this course the projects accounted for about a quarter of the work done by the students, in contrast to the design studios where the project defined the course.

A benefit of having the faculty serve as proxy was that students had less delay in getting answers to their project related questions but in both projects students were in the community, gathering information and gaining an understanding of the social, political, and economic issues as well as the technical challenges. This brought to the forefront the ideas that most real situations are considerably more complex than those faced in the classroom and that those real situations can inform and validate what happens in the classroom. Team members reported in to the rest of the class on progress and challenges, which gave those not directly involved an understanding of the different set of trade-offs faced by those working in the community in contrast to those working on lab based projects.

While the “faculty as proxy” helped with responsiveness, it did nothing to mitigate the effort required to get to the project sites, to meet the needs of the stakeholders, or to create a report that was accessible to all involved. Developing a clear problem statement also required a larger effort than the lab based projects, primarily because of the need to include details about the context that would drive the decision making process.

The fall 2011 design studio was similar to the 2010 version in that it asked “what can design and technology do to push change in a sustainable direction?” However, the context changed from an on-campus building to an off-campus district about a mile away. In this case there was no explicit connection to end users or organizations in the community (theoretical model). Students were asked to develop a sense of the context through observation and informal discussions with residents and workers. Some of the observation was guided by a directed walking tour, time on a shuttle bus that services the district, and meetings held in buildings in the district. Some of the groups surveyed or interviewed “the man on the street” or “the local restaurant owner”, usually to get feedback on an idea (e.g. “would you use ____ if it were available?”).

Again, the students worked in collaborative teams including engineering and industrial design majors to create responses to the context and premise of the studio. Teams were asked to prepare problem statements, design specifications, conceptual designs, detailed designs, working prototypes, and present the results of testing. The goals include developing an understanding of the design process; articulating decision making rationales; communicating aesthetic and technical ideas to a diverse audience; broadening the skills necessary to weave pieces into a coherent whole; experience struggling with complex, open ended problems; and gaining expertise integrating the human, physical, cultural, economic, and political context into decision making.

One of our hopes was to get more quickly (than we had in 2010) to problem definitions so that there was sufficient time for building and testing. This was not the case; in fact it seemed that without the more direct connection and bond that developed during the research of the previous year, defining the problem took longer and that the problems were not as well focused as they had been in 2010.

The final products for the semester tended to be more generic than the products of the 2010 studio. For instance one group developed an information kiosk that provided historic, energy, and water use information. While the specific content was based on the district there was nothing in the design that made it “of the district”.

Discussion of Models: Education

“The Craft of Teaching” is designed as an introductory course to teaching and learning in US schools. Students were asked to investigate the social, political, economic, and cultural forces at play in the education of America’s children. Students in the course have all experienced educational successes and have been accepted to an elite institution, so many of them come into the class with pre-conceived notions about what makes good schooling. While many of the readings and course experiences push students to challenge their assumptions, we wanted to give students an opportunity to grapple first-hand with some of the issues discussed in class, while also providing support to a community based partner.

In the spring of 2010, a nearby urban high school located 10 minutes north of campus was declared a persistently failing school under the guidelines of the No Child Left Behind Act of 2001. This urban community is very small and has a high density of poverty and many immigrant families. Many students are non-native English speakers, and many do not come from

a college going culture. Because of its persistently failing status, this high school underwent extensive reform. One area of focus was college access counseling to augment the school's guidance department efforts, improve graduation rates, and the percentage of students who went on to post-secondary education. A group of students in "The Craft of Teaching" were engaged in college access counseling in collaboration with teachers and administrators at the high school starting in the fall of 2010. A cohort of students, including some of the original members and some new, continued the work through a Group Independent Study (GISP) in the spring of 2011 and again through the most recent iteration of "The Craft of Teaching" in the fall of 2011. All students engaged in CBL were given alternative assignments from their peers in the class who were not engaged in CBL. These assignments were specifically aimed at helping students reflect on and assess the experiences they had in the field and on synthesizing and contextualizing course content. All students were selected to be members of this community based learning through an application process.

During the fall of 2011, another CBL opportunity was incorporated into "The Craft of Teaching." Students who were teaching young people in some capacity in the university's urban core, either as tutors in classrooms, or as leaders of afterschool programs, enrolled in the course. We will refer to this group as "tutors."

Tutors were required to create binders of all lesson plans they taught and any student work that would illustrate the outcome of those lessons. At the end of the semester tutors presented case studies of their work through a presentation and a paper, describing and assessing the work they did using data collected from their CBL experiences, and outside research on issues observed in the field. Finally, as a way to encourage support and dialogue, tutors were given dedicated TA groups where they were free to share experiences, problem-solve, and connect course literature to their teaching.

Students engaged in college access counseling started their work by conducting research about the reform underway at the school and the surrounding neighborhood and then conducted a Community Asset Research Project (CARP). In groups of 3-5, students went to the community to gather data from a 10-question survey. The survey asked about community resources (hospitals, YMCA, Boys and Girls Clubs, etc.), public transportation in the area, and other neighborhood assets. After the survey, students submitted a written reflection comparing this urban community to the university's neighborhood, their childhood neighborhood, and the characterization of the neighborhood in the media. This investigation of the neighborhood was intentionally designed to make students challenge the assumptions they may have about the community, and to think critically and more holistically about the people and place with which they were about to engage. After this initial community research, students began visiting the school and working with students on a weekly basis. The university students simultaneously consulted the literature on successful college access programs for similar communities and began creating a curriculum based on their research and their assessment of the high school students' needs. Similar to the tutoring group, the college access cohort also presented a case study at the end of the semester where they described their work, assessed it, and provided recommendations for how to improve on it.

Survey discussion

In order to gauge the benefits of CBL and changes in attitudes towards working in communities, a context and community survey was sent to 90 students who had taken either the engineering and design (40) or education (50) courses described in the paper. Of the 90 surveys sent we received 51 responses (19 out of 40, 48% for design and engineering and 32 of 50, 64% for education).

Question one asked the student if they had participated in prior community based work and if so to describe the project and relationship with their community partner. About 63% said that they had with a wide range of topics and levels of engagement.

Question two asked if the project had changed the way they see the world or helped them contextualize and apply course knowledge. Only one student said no to this question. There were two answers that were not applicable. Of the 48 that responded yes, the most frequent change was recognizing the need to seek and consider others' input, followed by recognition that working in context significantly increased the complexity of the task and also increased the engagement with and understanding of the course content.

Question three asked whether working in a community context added or detracted from the course. Seventy-five percent thought that it added to the class, 16% thought it detracted/distracted, and 9% gave inconclusive responses. Of those who said that it detracted, they felt that the challenges faced in the work detracted from the rigor and their engagement in the course.

The fourth question asked students what they learned about working with a community/context. Words such as "hard", "difficult", and "challenging" came up frequently along with "it takes time and patience" and the recognized need to be "flexible and persistent." There was also a sense that the community and context provided a rich resource for information, ideas, and feedback.

From the survey responses we extracted a list of positive and negative aspects of the work and representative comments from the students. These are summarized in the table below.

Positive aspects	Student responses
Learned to work in a group that shared a common goal	"I learned that to work in a group, I needed better communication. Before this class, I assumed everyone else saw facts the way I did; I thought that what I saw as obvious, everyone else would see too. This is usually not true. I learned to talk through the conclusions I was making, even if they were obvious."

<p>Gave a sense of responsibility and provided motivation</p>	<p>“Working within the context added to my engagement with course. It was important to me to help solve a problem for a community, giving my work more meaning as opposed to solving a problem of my own. I feel that I would be more easily satisfied by a mediocre design if I were working for myself, but with a "customer" base, I had to work hard because I had no idea what would universally satisfy the customers.”</p>
<p>Moved toward being a community member</p>	<p>“I wonder how we aren’t more uneasy with the university’s occupation of Providence, with the lack of engagement in classes about Providence and the vast inequalities that the university makes in the city. Why is community work extracurricular? What if Brown, with its money and power, advocated for the people of Providence? What about a Year of Providence, for a change? This is all to say that I believe in education that prepares and sustains people to recognize and overcome injustices, and I think community-based learning in (university) classes can be a start to such work.”</p>
<p>Provided experience with the complexity of real world problems</p>	<p>“the constraints were challenging. they [<i>sic</i>] caused a lot of stress and difficulty but ultimately it's something we had to adapt to and learn from. it [<i>sic</i>]can be hard to reconcile one's own creativity with these kinds of practical pressures, but it's necessary and so would say that the "community context" was difficult but useful.”</p>
<p>Gave students a realistic understanding of how to do this work and inspired students to continue this work.</p>	<p>“I learned that there are <i>many</i> unexpected complications and that you need to learn to be very flexible and persistent. I also learned that it is very helpful to have a strong contact in the community and then if possible, create more contacts to strengthen your presence there and ensure that work can be continued without putting too much pressure on one person trying to help you out.”</p> <p>“It also is hugely responsible for fostering a love of education in me, one that I’m sure will be there for the rest of my life. So overall, an amazing experience and I’d support the addition of similar ones throughout Brown classes.”</p>

Deepened students' intellectual engagement with course content.	"There is only so much one can do when reading and intellectually thinking about the issues of education, but to be able to add another component of actually participating in a school and adding that additional framework stimulated me more intellectually."
Negative Aspects	Student responses
Confusingly complex	"It was an impossible task to throw at us: understand an entire community that half of us haven't even heard of before. Going around talking to people was never going to be a full sample of the community."
Challenging to sort out priorities	"...the energy studio prompt of ICLEI standards were a really difficult context to navigate with our project. However, I liked the context of working within the [district]. However, whereas our project hoped to nudge cultural ideas of sustainability it had to work back to meet some sustainability standards that seemed very forced versus natural."
Too big for one semester	"My caution, then, is against service learning programs in university courses that don't provide enough time to really become rooted in an organization. Semester-long work can sometimes feel like it just brushes the surface, and it takes so long to settle into the work, there isn't as much time to reflect on certain practices or implement changes and examine their success. As long as community-based learning involves work with organizations that are committed to training, supporting, and authentically including the volunteers, then I think it can be a great asset to the liberal learning experience."
Detracted from learning goals	<p>"Completely detract. Having to sacrifice good design opportunities to simply match what the syllabus "said" was a major roadblock in our design. There were opportunities to move away from the specific requirements of the class into new and interesting areas; but group members would constantly return to how we "had to listen to the syllabus."</p> <p>I realize the real world might not ever be this simple, but in school where we have this freedom, it is important to encourage out of the box thinking."</p>

Difficult to manage effectively	“The biggest challenge was trying to conduct all the research necessary to have a complete view of the context and problem within the condensed timeline of an advanced studio. I picked up more time management and people skills and practical things like how to interview.”
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Conclusions and Implications for Future Work

The CBL components of the courses asked students to produce work that married the context of the community partner with the goals of the course. We wanted to see that students could take the knowledge learned in the courses and actually apply those in a real world context, and, in the process, to continue their journey of becoming members of communities. Atelia Melaville and her colleagues, writing for The Coalition for Community Schools stated it this way: “In order to learn how to be citizens, students must act as citizens. Therefore, education must connect subject matter with the places where students live and the issues that affect us all. Schools are ideally situated to connect learning with real life; but typically, they do not. To a large extent, public education – following the lead of higher education – has failed to recognize the benefits of student engagement with their communities in acquiring knowledge.”⁶

For the majority of students that we surveyed the work in the community and context added to their learning in the course in significant ways. However, there is certainly a vocal minority that found this layer at best a distraction and a worst detrimental to their progress. This implies that we should clearly articulate not just the learning goals of the courses we offer, but also the methods we will use. It emphasizes the need for students to be given a clear understanding of the demands that will be placed on them and that they opt in to these demands. Furthermore, structured and frequent reflection, dialogue, and problem-solving opportunities should be integral to course design.

One tacit assumption throughout CBL is that there is a positive impact on the community but a challenge is to demonstrate that learning and working with the community are synergistic rather than at odds. In many cases it is just that, an assumption, with too few concrete and specific instances of positive change, and no clear way to value the changes. While we have shown that it is valuable on many levels for many students, we think there will be great reward in developing and using tools that give reliable insight on how the community is affected.

Although we use the phrases “engaged scholarship” and “community based learning”, they have some disquiet about them. Are those who are not “engaged scholars” disengaged? Does community based learning exploit the community for the sake of education? These issues arise frequently when we talk with those who are not “engaged scholars” about what we do. The words smack of exclusiveness, while at the same time opening the field to accusations of lacking rigor. A fundamental reason for the apparent lack of rigor is the inherent “messiness” of working in the context. There are pieces that submit very nicely to analysis, while others, by their complex web of interactions remain murky. This calls for the development of tools and language that begin to clarify the murkiness.

Despite the fact that the constraints imposed by a semester long project are very limiting to students' integration into the community organizations, we hope in the future to find ways to truly immerse our students in the contexts and communities in which they undertake this work. This creates a stronger sense of responsibility to the work and more authentic work that grows organically from the needs of a community. As Smith asserts: "Only through immersion in the field; through the experience of engagement with agencies, programs, and their clients; and through careful observation and listening can one truly build the collaborative skills necessary for effective engagement."⁴

Many of us hope (the authors included) that we can leverage the enthusiasm and idealism of the students we work with to benefit the communities that surround our institutions. Despite the inherent challenges, we believe that working in a community provides many worthwhile opportunities for students to contextualize disciplinary knowledge, while helping to develop essential cognitive and reflective skills. We believe engagements outside the classroom are crucial to developing students who are engaged in meaningful work and learning that builds strong ties between individuals, the academy, and community.

1. M.E. Dyson: *The Michael Eric Dyson reader* (Basic Civitas Books, City, 2004).
2. E.L. Boyer: *The Scholarship of Engagement*. *Bulletin of the American Academy of Arts and Sciences* 49, pp. 18 (1996).
3. : *The Curriculum at Forty; A Plan for Strengthening the College Experience at the University*, (Brown University, City, 2008), p. 48.
4. M. Smith: *A Reactive, Radical Approach to Engaged Scholarship*. *Journal of Higher Education Outreach and Engagement* 15, (2011).
5. A.H. Van de Ven: *Engaged scholarship a guide for organizational and social research*, (Oxford University Press,, City, 2007).
6. A. Melaville, A.C. Berg and M.J. Blank: *Community-Based Learning: Engaging Students for Success and Citizenship*, (The Coalition for Community Schools, City, 2006).