WIP: Adventures in Creating a Transdisciplinary Community-Engaged Capstone

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Introduction

While many capstone programs focus on connecting students with industrial or research lab sponsors to work on real-world projects[1], a small team of engineering and liberal arts faculty at the Rochester Institute of Technology (RIT) has been reflecting on ways to connect students directly with grassroots, community-based organizations to work on projects identified and prioritized by local communities. Other universities offer engineering capstone projects with non-profit partners, but these programs typically follow service-learning (EPICS)[2] or social entrepreneurship models (Ashoka U)[3]. We are focusing on developing capstone experiences using best practices of democratic community engagement to achieve "communal" rather than "transactional" relationships[2]. Doing so requires providing students with additional training and advising so that they are able to engage partners with respect, transparency, and the goal of building trust in a long-term relationship that provides mutual value[4]. In addition, engaged projects rarely fall neatly into disciplinary boxes or university calendars, which necessitates taking a transdisciplinary and multi-semester approach. We set out to develop a flexible course that could serve as an alternative to the capstone courses in multiple colleges for students who aspire to work in community-engaged contexts after graduation. With the support of a VentureWell Course and Program Grant, we piloted our *Collaborative Community Capstone* course in Fall 2021.

Background and Context

At the University level, RIT has a robust innovation and entrepreneurship ecosystem established through interdisciplinary centers like the *Simone Center for Student Innovation and Entrepreneurship* and the *Magic Center* focused in the digital media space. RIT is also member of the *Kern Entrepreneurial Engineering Network (KEEN)*, which promotes entrepreneurial-minded learning (EML). In parallel, RIT has been formally engaging with community organizations for experiential learning and research through our *University Community Partnerships* since 2000, and in 2016, committed to grow civic engagement on campus by signing the *Campus Compact*. However, this existing ecosystem has failed to support students who wish to work at the crossroads of innovation and community engagement to address challenges identified and experienced by local residents at the community level.

The two-decade old Multidisciplinary Senior Design (MSD) Program in the College of Engineering currently enrolls more than 400 students per year from five engineering disciplines in a two-semester design and build capstone course. Various projects have addressed social challenges and worked with non-profit partners, but the teams utilized a consulting model as they would with an industry sponsor, rather than a community engagement model. In addition, there have been past collaborations between MSD teams and capstone students in design, business, museum studies, art, engineering technology, and imaging science. However, these collaborations had one-off department approval. Lack of formal structure has led to various levels of student team cooperation depending on logistics, the alignment of requirements across disciplines, and the individual students involved.

Collaborative Community Capstone Vision and Motivation

The Collaborative Community Capstone aspires to be a model for bringing undergraduate students, faculty, community partners, and local residents together in long-term, mutually beneficial partnerships[2,4]. It will be the culminating experience in a series of courses, potentially a minor. The projects and partnerships will span semesters or years as needed with a focus on improving both community well-being and mutual understanding of democratic processes. Our community partners bring expertise on local context, rich life experiences, and an organization of

motivated people committed to improving community wellbeing. Our students bring fresh perspectives, understanding of emerging technologies and methods, and access to the extensive resources of the University for research and design. Students in previous engaged courses express appreciating learning about people's lived experiences, particularly the social-cultural context within which solutions have to be fashioned, which is important to success and is an area of learning often missed in technical education. Some students have gone on to work or volunteer with partners and the City after graduation.

Collaborative Community Capstone Structure

The Collaborative Community Capstone course follows a non-disciplinary specific project structure of Plan, Do, Check, Act, and Reflect phases, repeating each semester. Teams meet in two 3-hour blocks per week and receive mentorship from a faculty guide. Phase review meetings are held with the partner every 3-4 weeks and the team completes associated documentation updates, peer reviews and reflections on team and community processes for assessment. The partner provides feedback on the project work and on their partnership experience each phase. The course learning outcomes were compiled from the capstone syllabi for MSD, Industrial Design, and Science Technology and Society capstones and then summarized under a version of the ABET Criteria 1-7 adapted for transdisciplinary and community-engaged work. The engineering students utilize materials from the typical MSD course, but their progress is de-coupled from the normal timeline. Non-engineers meet regularly with a disciplinary advisor, utilizing tools from their disciplines. Other faculty and community experts are consulted as needed. Students are evaluated by the faculty guide on Community Engagement Processes (20%), Team/Project Management Processes (20%) and Reflective Practice (10%). Disciplinary Deliverables (50%) are graded by the disciplinary advisor.

Pilot Experience and Key Learnings

For the pilot experience, we ran a single team working in collaboration with the IBERO American Development Corporation (IADC). IADC had an existing relationship with RIT's University Community Partnerships. They identified "access" to the new Rochester International Plaza as a priority for the collaboration. The International Plaza is a dream come true for many residents of the El Camino neighborhood, the result of 50 years of community engagement, organizing, and advocacy by IADC and its affiliates. IADC and the City of Rochester manage the Plaza collaboratively. Goals of the Plaza are to support local small business development, celebrate the diverse cultures represented in the neighborhood and to reclaim space (previously an abandoned lot) in the neighborhood for positive community activities. The pilot project was advertised to students in Spring 2021. A team of three mechanical engineers, an industrial engineer, a designer, and a science technology society student was assembled for a Fall 2021.

After introductory lessons on best practices in community engagement and a review of the work done by El Camino residents pre-pandemic, the students conducted interviews and developed a systems model. They considered "access" broadly: improving pedestrian safety, adding amenities, recruiting and retaining vendors, making the plaza more visible, and improving marketing materials, etc. The pilot team did not include business students, so we moved forward with twin goals of advocating for street re-designs for the dangerous section of road in front of the Plaza and working to improve Plaza amenities. Through the design process, students have had a chance to learn from one another and utilize the tools of various disciplines. They have had the opportunity to visit the site multiple times to collect traffic data, take measurements, meet residents, and interview Plaza visitors. In addition to IADC representatives, they have been able to interact with a broad range of local groups including the Scrantom Block Club, Rochester Hispanic Youth Baseball League, ReConnect Rochester, Genesee Transportation Council, Rochester City Council and the Traffic Control Board. The students have expressed initial and sustained interest in the project because "the work they do matters," and have moved from seeing themselves as consultants to being partners.

The biggest challenges of the pilot have been 1) finding a way for students from many disciplines to take a single scheduled class but get credit for capstone; 2) how to give disciplinary advisors credit in their plan of work; 3) helping students adopt an attitude of working as partners rather than transactionally; and 4) continuing difficulty connecting with residents and collecting data due to the on-going pandemic and winter weather (lots of snow).

References

[1]S. Howe, "Capturing the Big Picture: The 2015 Capstone Design Survey," *Resource,* vol. 23, *(5),* pp. 31, 2016.
[2]J. D. Thompson, "Transactional, Cooperative, and Communal: Relating the Structure of Engineering Engagement Programs with the Nature of Partnerships," Michigan J. of Community Service Learning, vol. 23, (2), pp. 83, 2017.
[3]A. M. McBride & E. Mlyn (eds). Connecting Civic Engagement and Social Innovation: Toward Higher Educations Democratic Promise. Campus Compact, Boston, MA, 2020.
[4]E. Hartman, "A strategy for community-driven service-learning and community engagement: fair trade learning," *Michigan Journal of Community Service Learning,* vol. 22, *(1),* pp. 97, 2015.