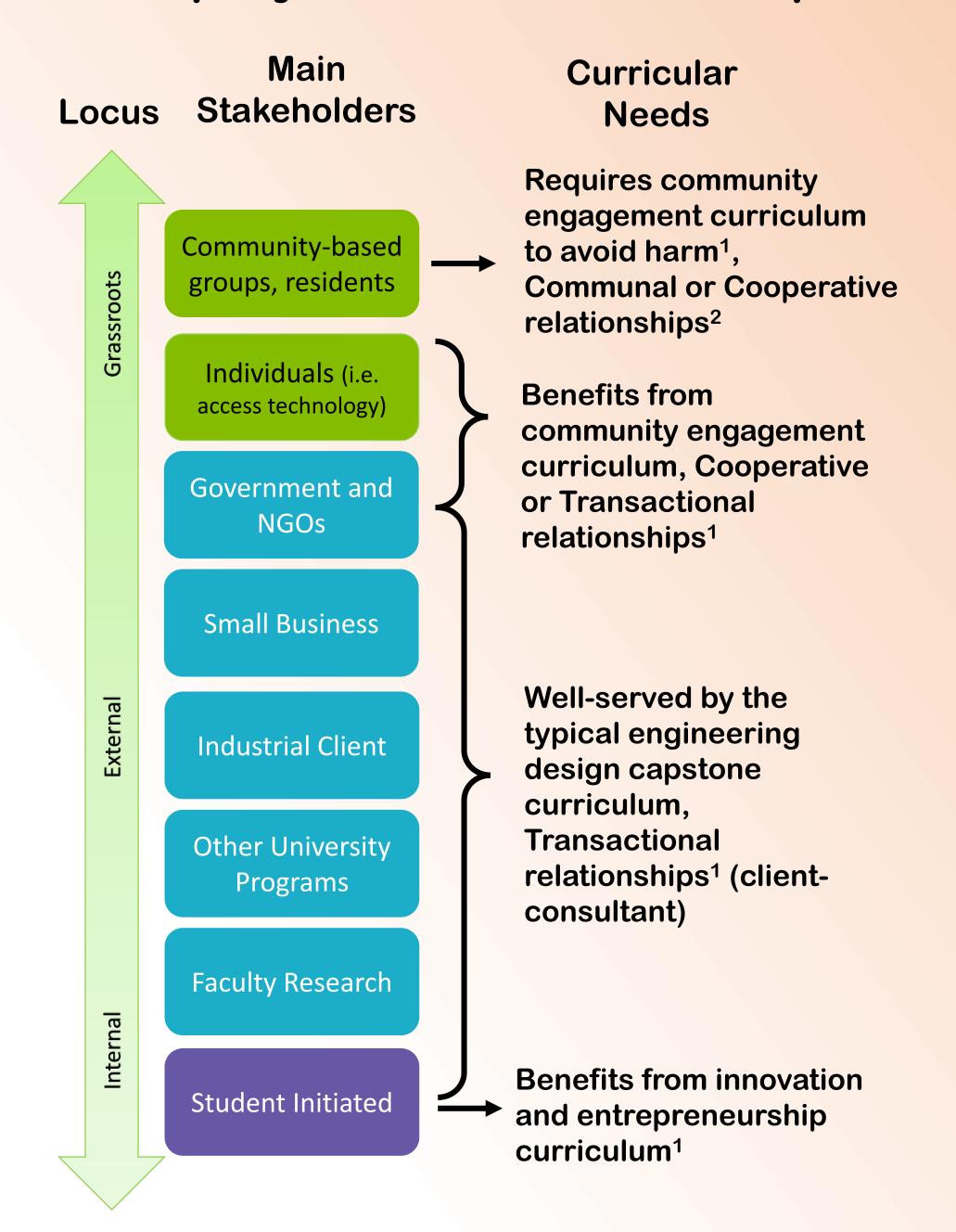
Adventures in Creating a

Transdisciplinary, Community-Engaged Capstone

Sarah A. Brownell, Rochester Institute of Technology

Background =

Not all projects are created equal...



Objective

Develop an alternative capstone course to:

- Connect students directly with community-based organizations.
- Facilitate authentic, mutually beneficial community relationships.
- Work on projects identified and prioritized by local communities.
- Incorporate the variety of disciplinary skills needed.
- Allow projects to span semesters.
- Culminate a future minor...

Potential Social Impact Design and Engagement Minor

1. Foundations of Community Engagement and Transformation (Science, Technology & Society (STS) General Education)

2a. Sustainable Communities (STS General Education)

2b.Human Centered Design (Applied Engineering Elective)

3. Choice of supporting course

4 & 5. Collaborative Community Capstone (General Engineering, Crosslisted, 2 semesters)

References =

¹A. M. McBride & E. Mlyn (eds). *Connecting Civic Engagement and Social Innovation: Toward Higher* Educations Democratic Promise. Campus Compact, Boston, MA, 2020. ²J. 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.

³E. 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.

Support =



2019 Course & Program Grant (3 years) Creating an Implementation Course for the Social Impact Design & Engagement Program: Expanding RIT's Innovation and Entrepreneurship Ecosystem to Alleviate Poverty

Kate Gleason College of Engineering **Multidisciplinary**

Senior Design

Results

Course Follows Fair Trade Learning³ Values:

Learning Goals

ABET goals modified to reflect Engineering, Science, **Technology & Society and Industrial Design Capstone** Syllabi & Fair Trade Learning.

Modified ABET ABET

ABET 7: An ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Modified ABET 7: Demonstrate self-directed learning through research as well as through active istening and acknowledging and adapting to community

Grading

Team Contribution Feedback Area **Community Engagement Processes (Guide) Team Processes (Guide) Disciplinary Deliverables** (Disciplinary Advisor) **Reflective Practice (Guide)**



Respect

Inclusion

Transp

Mutual Benefit

Rights

Long-term commitment

Listening

Shared intent

Self-determination

Love

Partner: IBERO American Development Corp.

*Design Reviews Each Phase

Reflect



Fifty year history in the El Camino Neighborhood:

- Community organizing
- El Camino Plan
- Housing construction
- Recreational Activities
- Social services
- Advocacy

Project: Improve "Access" to the Rochester International Plaza.

ional Plaza Access Systems Model

Diverse Student Interest

Spring 2022 Fall 2021 volunteer support Society, Pedestrian Streets engineering, Street

Research

re-design proposa

Valuable Experiences

Resident Interviews at Plaza events Block Club meetings Researching City / Traffic Regulations **Many Stakeholder and Group Meetings Traffic Data Collection and Analysis Presentation to Traffic Control Board Combined Engineering, Design and Social Sciences Methodologies**

Proposal to City Council

Plaza Elements



Street Elements

Traffic calming and pedestrian safety



Challenges

Early recruiting of non-engineers

Student disdain for uncertainty

Disciplinary advisor credit

Countering the transactional mindset **COVID** and Snow

Engineering Semester I **PLAN**: Partner Interviews, Observation, Team Roles, Norms & Values, Goals, Engagement Plan, Project Plan

<u>DO</u>: Engage Stakeholders, System Model, CR/ER, Research/benchmark, Functions, Concepts,
Systems Design

CHECK: Feasibility
Analysis, Early
Prototyping,
Community Feedback

ACT: Revised System Model, Detailed Design, Drawings, BOM, Theory of Change, Risk analysis

Reflect: Reflect on team processes, planning, risk mitigation, and community engagement.

Engineering Semester II

PLAN: Interviews, Review Team Roles,
Norms & Values, Goals,
Engagement Plan,
Project Plan

DO: Update Systems
Model & Requirements,
Test Plans, Integrate
Design and Engineering models, Subsystem build

CHECK: Subsystem test, System integration

ACT: Complete system build and test, finalize documentation, community feedback

> Reflect: Reflect on team processes, planning, risk mitigation, and community engagement.

Science, Tech, Society

PLAN: Partner Interviews,
Observation, Team
Roles, Norms & Values, Goals, Engagement Plan, Project Plan

DO: Engage
Stakeholders, System
Model, Research topic
history, Annotated
bibliography, Blog Post

CHECK: Continued research & interviews,
Blog Post, Final
Product plan/outline,
Community Feedback

ACT: Develop final product (paper, website, game, etc), Theory of Change, Risk

> Reflect: Reflect on team processes, planning, risk mitigation, and community engagement.

Business

PLAN: Interviews, Review Team Roles, Norms & Values, Goals, Engagement Plan, Project Plan

DO: Engage Stakeholders, Systems Model, Market Research, Primary Research, Business need/case

CHECK: Analysis: Production methods, distribution channels, barriers, risks, threats, Community Feedback

> ACT: Document Findings and Recommendations, Financial Model, **Complete Business** Plan

Reflect: Reflect on team processes, planning, risk mitigation, and community engagement.

Design Semester I

PLAN: Partner Interviews, Observation, Team Roles, Norms & Values, Goals, Engagement Plan, Project Plan

<u>DO</u>: Engage Stakeholders, System Model, ID aesthetic / functional / operational characteristics, Concept generation

CHECK: 2D and 3D appearance models, Prototype testing, **Community Feedback**

ACT: Revised System Model, Narrowed options, Color, Finish, Material, Branding, Testing, Theory of Change, Risk

Reflect: Reflect on team processes, planning, risk mitigation, and community engagement.

Design Semester II

PLAN: Interviews, Review Team Roles, Norms & Values, Goals, Engagement Plan,
Project Plan

DO: Update Systems Model, Integrate Design and
Engineering Models,
Refine Color, Finish,
Material, Branding.

CHECK: Demonstrate integrated concpets with stakeholders, Refine designs

ACT: Implementation, Update Process Book, Community feedback

Reflect: Reflect on team processes, planning, risk mitigation, and community

engagement.

ABET 1: Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.

Modified ABET 1: Apply disciplinary principles and strategies in an interdisciplinary context to complex challenges that have been identified and defined by community

partners.

ABET 4: Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

Modified ABET 4: Demonstrate ethical and professional responsibility, extending it to the context of civic responsibility and the promotion of social wellbeing.

ABET 2: Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.

Modified ABET 2: Apply disciplinary tools in an interdisciplinary context to add value to a communityled project within the larger global, cultural, social, environmental, and economic climates.

ABET 5: Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.

Modified ABET 5: Demonstrate effective interdisciplinary collaboration skills within a team including student members, faculty advisors and community partners.

ABET 3:

with a range of audiences.

Communicate effectively with a wide range of audiences, especially

Modified ABET 3:

community partners.

ABET 6: Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to

draw conclusions.

Modified ABET 6: Utilize research and/or experimentation techniques of the discipline and apply judgement to draw

conclusions.