

Incorporating Public Deliberation into Sustainability Education

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Abstract: A course in sustainability was implemented at the University of Houston-Downtown (UHD). The course was open to all students at UHD with a goal of teaching sustainability as the complex interaction of multiple fields (economics, social science and environmental science). UHD's Center for Public Deliberation (CPD) was interested in applying the concepts of public deliberation into courses outside of communication. For effective public deliberation, students need to learn the skills of soliciting and incorporating diverse opinions as a pre-requisite of working together toward a solution. Many students attracted to sustainability, including science and technology majors, do not realize that most problems of sustainability are not merely technical problems but problems that arise from conflicting ethical frameworks. Students outside of public deliberation rarely have an opportunity to practice engaging in the tools that will be critical for them to develop solutions within the complexity of current social systems. We review the value of public deliberation in higher education and the logistics of bringing public deliberation into a sustainability course. We summarize the logistics of the collaboration with a focus on deliberation, planning and action in a semester-long group projects with a focus on creating healthier communities. We report on the impacts of both the communication and science faculty and the survey data from students. Finally, we discuss the value of such a collaboration in sustainability education.

Keywords: sustainability, public deliberation, collaboration, community, group-projects

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In 2017, the University of Houston-Downtown (UHD) started several courses in sustainability along with a new Minor in Sustainability. On an urban campus of nearly 15,000 students, it was well past time to introduce this curriculum to UHD. The first of these courses was Fundamentals of Sustainability, (SUST 3302). A faculty member from the Natural Sciences (NS) designed the course with an eye on the sustainability triangle (environment, social stability and economy). Rather than being a course merely open to biology or environmental engineering students, the course and the entire minor were available to every major at UHD. Just after this course was developed, UHD's Center for Public Deliberation (CPD) initiated a collaboration with other UHD Centers. The goal of this collaboration was to integrate public deliberation into areas of the university including science, business, urban education and critical race studies. The instructor of SUST 3302 was also the Director of the Center for Urban Agriculture and Sustainability (CUAS). Through the collaboration with CPD and the CUAS, the idea was first introduced to bring public deliberation into the science and sustainability curriculum.

All faculty in the CPD collaboration began considering public deliberation during a polarizing time in the American landscape. The faculty were from diverse backgrounds and they began by educating themselves in the fields of public deliberation. Faculty engaged in online learning modules about public deliberation and they started quarterly meetings about public deliberation. During these meetings faculty lamented a noticeable increase in partisan politics, an erosion of public trust and the discrediting of expert knowledge. Public deliberation and its role in building consensus seemed more important than ever. These discussions also led to vigorous discussions about how change occurs, the role of experts in that change and whether experts matter if nobody feels heard. Scholars and specialists with useful information cannot be useful in the decision-making processes if they cannot engage in the concerns of others or if they have not practiced bringing diverse opinions together toward a resolution. Finally, it became clear that a university must give all students skills in public deliberation for them to be successful. Within the field of science the question was, what do public deliberation skills look like in classrooms that are based on experimentation and interpretation of data? Given that sustainability seeks to create stability between social, economic and environment systems, we wondered if public deliberation could be a bridge between these three areas? This collaboration and these discussions cemented the idea that we should integrate public deliberation activities into science and sustainability curriculum.

What is Public Deliberation?

Public deliberation is known by many different names, including *deliberative civic engagement*, *deliberative dialogue*, *democratic deliberation*, *deliberative democracy*, and *discursive democracy* (Nabatchi, 2012). Delli Carpini and colleagues conceptualize public deliberation as having five main themes, which include: concerns talk between citizens, elevates talk as a critical form of engagement, includes but is not limited to formal institutions, occurs through a variety of media, and can be focused on local, national or international issues. Perhaps even more helpful, is his conceptualization of what is not public deliberation. This includes elite to elite discourse (ie. confessional deliberation, talk shows), citizens to elite (ie. school board meetings, call-in radio); personal meetings not related to issues of broader concern, and it is not

voting, volunteering, protesting or direct public problem solving through community organizations (Delli Carpini et al., 2004). Quality public deliberation in group meetings was described by Burkhalter et al. (2002) and elaborated on by Gastil and Black (2007) as having eight critical components. These components include “a solid information base, explicit prioritization of key values, an identification of alternative solutions (sometimes preconfigured beforehand, but often still subject to amendment), careful weighing of the pros and cons... equal opportunity, mutual comprehension and consideration and respect” (Nabatchi et al., 2012, p. 211). Public deliberation is an effective framework for creating a space where diverse issues can be heard and it can an excellent forum for solving complex problems. Despite its value and its successful application to many fields, the systematic integration of public deliberation into most academic disciplines has yet to happen.

Bringing Public Deliberation to a Course to the Natural Sciences

There are numerous reasons why public deliberation is valuable for science education. First, science students must be able to make a clear distinction between information and real-life actions based on that information. Science courses focus first on the attainment of accurate scientific information. In a sense, science students are trained to become future experts of the natural world. The consideration of how the knowledge will be used or what the process looks like in real life are less often considered in science classes. Second, students are taught to solve problems in science courses but the problems are always solved through the lens of a technical solution. A consideration of “wicked” problems, those not easily solved with a technical solution, are rarely focused-on in science curriculum. By omitting these kind of problems from most classes, we are depriving science students experience with the complex realities of economics and behavior in a society. These science students will become scientists who are shocked when the people do not just listen to them or make the logical decision based on the scientific data. Clearly, science students must gain practice engaging in complex conversations so they can be valuable participants in solving future problems.

Science education does attempt to teach ethics. Typically, complex ethical thinking is introduced through ethical debate or a “taking sides” activity. Usually, students are assigned sides randomly so as not to reinforce preconceived opinions. Such activities may also introduce students to questions that cannot be solved through data interpretation alone. However, such activities are woefully inadequate. First, debates feed into the primitive idea that there are two extreme sides of all complex situations. This approach does nothing to address the simplistic view that there is a “good” or “bad” solution to every problem. Deliberation and problem solving from diverse perspectives is much more effective tool at teaching complex and these pedagogical approaches mimic the real-life scenarios students will find themselves when they graduate. Drury (2015) describes that bringing deliberation to an introductory biology course and suggests such an approach is useful “for teaching STEM and non-science students the habits and skills of citizenship, the consideration of wicked problems, and complex problem solving.” Additionally, Weasel and Finkel (2016) incorporated deliberation into larger, lecture-based, non-majors introductory biology course at an urban university and they were able to show that this approach improved both engagement and student learning. Although there is evidence that public deliberation is an effective teaching tool in the sciences (Drury, 2015; Lewis et al., 2019;

Weasel and Finkel, 2016), there is little evidence it is in the mainstream. This is certainly true at UHD.

Bringing Public Deliberation to a Course in Sustainability

Before introducing public deliberation to a standard science course, it was decided that Fundamentals of Sustainability, (SUST 3302), would be an excellent first course to implement public deliberation. First, the material lends itself to hearing from a diverse set of voices. Although the course is taught by science faculty, the course was designed around the concepts of the sustainability triangle (environment, social stability and economy) and the principles of the United Nations Sustainable Development Goals. In both these constructs, there is a focus on the interactions of disciplines and flow of information between them. Second, the course is an elective used for the new Sustainability Minor and has a more diverse student population than other courses in the sciences. Third, if students in this course could gain experience in a realistic deliberative experience (rather than a one-day debate) they would have a valuable skill for making real change in a future sustainability related career or initiative. Finally, the UHD NS faculty would be more willing to consider bringing public deliberation initiatives into science classrooms if a colleague had done it and was able to document a path and articulate the impacts.

One additional advantage of combining public deliberation and sustainability is that the field of sustainability embraces systemic change. For our planet to become more sustainable there needs to be systematic change at the cultural level (ie. rules, power, information flow, resource usage) (Meadows, 1999). Not only must students learn skills of navigating and combining diverse voices, the field of sustainability could use public deliberation for solving complex, systems-level problems. There are groups working toward understanding system complexity and choosing more sustainable directions (thenaturalstep.org). However, there needs to be more dialogue between the environmental, social and economic entities to solve climate change (the, resource use, water availability and biodiversity loss and the communication needs to be productive. A number of scholars have shown that the components of public deliberation are critical for promoting rigorous analysis and creating productive group efforts (Delli Carpini et al., 2004; Nabatchi, 2012). As is typical, it is usually difficult for effective concepts developed in one discipline to jump into other academic disciplines given the separation of departments or “silos” across universities. This cross-disciplinary collaboration is not typical, but served as a unique and valuable opportunity to combine areas of expertise.

Goals of the Collaboration

There were multiple goals for this project. The primary goal was to integrate public deliberation activities into the SUST 3302 course. The course still had to meet its content goals, but would now give the students an opportunity to participate in a comprehensive public deliberation exercise over the course of the semester. As the course had been taught twice before without public deliberation, the instructor of SUST 3302 would use the same final exams for content and surveys would be used to evaluate what students got out of the new public deliberation activity. The goal of the communication faculty member (public deliberation expert) was to bring the steps of public deliberation to a course that does not focus on the process of

communication. The goal of the science faculty (sustainability instructor) was to give students the opportunity to practice public deliberation skills as it relates to sustainability.

Logistics

The SUST 3302 course was taught in a hybrid format the year before which was an advantage for initiating this collaboration. In the previous iteration of the course, over half of the lecture material was converted to an online videos and class time was focused on mini-lectures and discussions. In this collaborative iteration, all lecture content was moved to online videos to be watched before class. The time the class spent together was utilized part-time discussing the content and part-time in the public deliberation process. The public deliberation practice at UHD goes by the title ‘Interact-to-Innovate’ (I-to-I). The I-to-I steps were added to each week of the syllabus and described to the students on the first day (Table 1). From the first week, students were put in groups of about 6 students at large round tables to begin the deliberative process. In the first half of the course students focus on naming and framing how to make healthier (more sustainable communities). Since sustainability is such a vague term, the faculty decided that focusing on healthier communities would allow the students to focus on tangible changes they want to see and realistic action plans to accomplish those goals. In groups, students discussed content areas to focus on through the lens of specific I-to- I prompts. The prompts focused the students on discussion of how the topic related to Houston and the UHD community and how the topic impacted them individually. The communication faculty also recruited a handful of senior communication students to sit at each table to keep students focused on the daily prompts and record discussions.

As part of the I-to-I plan, students had to engage in a number of discussions and activities. Each day at least half of the class period was spent on I-to-I activities. Early on students had to discuss the exploring of health in our communities through the sustainability lens (environment, social stability, economy). Students then began to “map” community and healthy connections as they considered all components needed to create healthy communities. Next, students were asked to set priorities and brainstorm ways to make a difference. Each group had to develop an action plan that included time-line, actions each participant would engage in and which experts to be consulted to evaluate the plan. Finally, student groups had a few weeks to complete their action plan before presenting it on the last class day (Table 1).

SUST 3302 Hybrid Syllabus Topics with Public Deliberation Modifications (Interact-to-Innovate)		
Week	Lecture Content Activities	Interact-to-Innovate Activities
1	Introduction to sustainability Discussion of sustainability	Discussion starter Exploring health in our communities
2	Economic development Discussion of economic development	Discussion of local economics Mapping community and healthy connections

3	Role of inequality and extreme poverty Discussion of inequality and extreme poverty	Discussion of local inequality and poverty Mapping community and healthy connections
4	Planetary boundaries and biodiversity Discussion of natural resources and biodiversity	Discussion of local resources Mapping community and healthy connections
5	Exam #1	
6	Agriculture and food security Discussion of agriculture and food	Discussion of local challenges of food production and food availability Mapping our community health connections
7	Energy and climate change Discussion of energy and climate change	Setting priorities How we can build a healthier community
8	Resilient cities and social inclusion Discussion of resilient cities and social inclusion	Brainstorming about ways to make a difference Reflecting on our I-to-I experience
9	Exam #2	
10	No sustainability content	Establish a plan and start working on action agenda
11	Role of education Discussion of education in sustainability	Work on action agenda
12	Role of healthcare Discussion of healthcare in sustainability	Work on action agenda
13	Sustainable Development Goals (SDGs) Discussion of SDGs	Work on action agenda
14	In class Group Oral Presentations	

Table 1. Syllabus for *Fundamental of Sustainability*, (SUST 3302), with lecture content (left) and additions of public deliberation semester-long Interact-to-Innovate initiative (right). Rather than a group presentation on a content topic, student groups presented on an activity they deliberated about, developed and then carried out.

The I-to-I activities supplemented the course content and resulted in specific action-driven projects. The addition of I-to-I required no modification of grading for the course. The class had already had a group project. In previous versions of the course, small groups of 3 students had to select a topic about how to make Houston more sustainable and present that at the end of the course. Now, slightly larger groups gave a presentation of a project they had brainstormed, built an action plan for, identified experts they needed to communicate with and finally accomplish an action built out the desires of the entire group. Faculty gave guidance to students on how to focus their projects, as projects often started as ideas too ambitious. The final projects developed focused on making a change on the sustainability of the UHD community over several weeks of the activity. Students had to develop projects, seek and incorporate expert advice and present on final actions that were accomplished (Table 2).

SUST 3302 Interact-to-Innovate Group Project	Relationships created	Action created
<p>Create a #SUSTAIN UHD Campaign to increase the number of sustainable actions by the UHD Community using social media, face-to-face interactions and swag incentives.</p>	<ul style="list-style-type: none"> • Faculty in Natural Science and Communication • Sustainability Coordinator • Student Government leaders • UHD Admissions office • UHD Health and Fitness 	<p>Engaged UHD students in participating in actions that promote sustainability. Most common activities were posting a “go green” fact and using a re-usable bottle/ bag, followed by recycling something followed by packing a meal and taking the stairs followed by using public transportation or repurposing something.</p>
<p>Take a previously created aquaponics system in the UHD Garden and make it functional for hosting fish and growing plants.</p>	<ul style="list-style-type: none"> • Faculty in Natural Science, Engineering Technology and Communication • Previous UHD students who had created the system • Mentors for the UHD Sustainability Garden and Compost Center • UHD Facilities staff 	<p>UHD Aquaponics system was made functional.</p> 

<p>Increase awareness about recycling in the UHD community at a public table. The table will engage participants in a game about recycling, offer prizes, educate them about errors and reinforce the value of recycling by getting a pledge to recycle.</p>	<ul style="list-style-type: none"> • UHD faculty in Natural Sciences and Communication • Student Government Association • Student Clubs • UHD Facilities • Some classrooms (announcements) 	<p>The table was an effective way to interact with UHD community about the value of recycling.</p> 
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Table 2. Description of student projects implemented by the Interact-to-Innovate projects developed by students, the relationships they had to create for their project and a summary of the action created.

Impacts on the Science/Sustainability Faculty

The addition of the I-to-I activities had numerous positive impacts on the class from the teaching perspective. First, the directed table discussions about what students felt was most important in their communities (as relevant to the day’s content) created engaged student discussion. Discussion in more technical science or sustainability courses do occur and are increasing in frequency as more faculty adopt flipped classrooms – classrooms where learning of content is moved outside of class and time together is spent in discussion or problem solving. However, rarely in a science or technical course is half a class spent with students focusing on how the information directly impacts their personal lives or what they think about an issue. The quality of discussion was also of high quality due to a sense of trust created from week to week and the creation of rules. The ‘rules of public deliberation’ were rules of conduct created collaboratively on the first day and agreed to by all members. This set of rules predictably included items such as ‘everyone needs to be heard’ and ‘nobody can dominate the conversation.’ Having these rules submitted and reviewed each week created collegial and democratic discussion groups where everyone participated more equally than is normally observed during discussion time in courses.

The addition of I-to-I activities takes up time and can create unease for faculty with lots of information to share. A small amount of information had to be deleted from the course to make room for the I-to-I activities. However, much of the content was delivered outside of the class in the form of online videos, combined with online lecture quizzes to make sure they had watched the videos. Early on in the class, a great deal of time was spent with students talking amongst themselves about what their opinions are, what their perspectives are and what they

value. It takes time to get this done and it can be unnerving for a faculty member (content junkie) to let go of so much valuable time. In most technical courses discussion about what a group should work on for a group project is typically 15 minutes a few times across the semester with slightly more near the end of the class. Starting so early on a project and giving so much time to discussion seemed a bit excessive early on in the process. However, the public deliberation mantra of “go slow to go fast” made much more sense as the semester moved forward. Students had to struggle with what they really wanted, they had to learn from each other and they had to determine best ways forward as a group. Pedagogically, the process was slow but effective and mimicking real-life experiences these students will encounter later.

Impacts on the Communication Faculty

I-to-I resulted in a number of learnings from a public deliberation communication standpoint as well. First, when we set up the project, we put the science students in the role of “content expert” and the communication students in the role of “facilitation expert.” While this set up worked well in some ways, we also slowly came to the realization of the necessity that the science students also see themselves as facilitation experts, also able to help improve the quality of the discussion around them, to facilitate multiple voices, for the purposes of effectively navigating systemic issues. In order to do this, a work sheet with eight “goals and techniques for good deliberation” was distributed to all of the students. Then, after each deliberation, the science students delivered feedback to the communication students and communication students to the science students. The activity allowed the science students to actively learn and think critically about the communication interventions that were being made in their meetings for the purposes of more deliberative interactions. This resulted in intentional learning around deliberative democracy and the difference between communicating knowledge and facilitating practical wisdom. In essence, the process of thinking through the public relevance of our courses has tremendous implications for how we develop our students to serve as democratic participants. Additionally, the experience pointed to promising ways in which experts can contribute vital roles to democratic deliberation by including mechanisms to hear from others.

Next, in the field of public deliberation, the term “naming” is used to answer the question “what do we talk about?” The practice of naming is ultimately about asking good questions and listening to others, who are part of a community, to name their realities. Often, when experts name issues, non-experts do not realize their stake in the issue because they do not talk about their reality in the same way as the experts. As an exercise in this skill, therefore, students engaged in a six-week process that encouraged them to “name” the expert information they were learning on their own terms and to consider how this information mattered in their daily life. While the process of naming is typically used in democratic discussions, it became clear how impactful this exercise was from a pedagogical standpoint as well. We observed students struggle in the beginning to connect the information, but as the process continued each week, they became more and more adept at making the connections between the information and its relevance to their own lives. Clearly, the ability to listen to expertly named information and translate it into everyday relevance is a difficult, yet essential, skill. As such, it gave reason to pause and consider the *role of knowledge*. If students have a wealth of knowledge but are unable to connect it to their reality, it seems some opportunities for building student agency are lost. It

also seemed to be an important skill for scientists as they play an important role to make information accessible for democratic discussion. Finally, in this particular initiative, for a number of reasons, we decided to narrow our conception of community to the university. As students fashioned their UHD sustainability projects, they initially wanted to duplicate projects that were already taking place in the university. During our classroom deliberations, they were encouraged to invite different university stakeholders to their deliberations as an exercise in learning the role of social capital in systemic agency. Students, in this exercise, learned how to think about social capital as an important resource as we act within systems. Additionally, faculty considered more deeply the notion of “professor” in our pedagogy. Inviting external community members to the classroom space, and situating them as teacher and learner, exposed our student to multiple ways of knowing and interacting with the information presented in the course.

Impacts on the students

The impact of this I-to-I integration had a measurable impact on the students. The SUST 3302 course and Sustainability Minor are both new so the class had less than 20 students. These students were surveyed about aspects of the I-to-I activities in the context of the SUST 3302 course. Some rather interesting observations came from this survey. Previous courses were not surveyed with such specific questions but previous course evaluations typically included student comments such as they learned a lot of valuable information and that they learned that the environment can only be made healthy if the social and economic aspects are also considered. With the I-to-I survey, we are able to see the direct impact of the semester-long deliberative process on the student experience. First, when asked what they thought was “the most important way” to address environmental sustainability, *students spoke about change in systemic terms, and most frequently advocated deliberative dialogue to support this type of change.*

- “Bring different backgrounds together for better ideas.”
- “To come out in groups and work with people about the importance of the environment.”
- “Even if a person is informed and inspired, they need opportunity. Working with others can be achieved when people come together with an attainable goal...”
- “With greater numbers you are taking into consideration a greater part of the community.”
- “Group projects help improve the quality” of sustainability efforts.

Students will often finish a sustainability course charged-up to change the world (which is good), but often with a misguided notion that it is going to be easy. They seem to think the others just need to be informed of what they know and then they too will see the world the way they do. Students don’t usually have exposure on the realities of solving a complex issue with a diverse group while trying to move forward. Any group work that is assigned in these classes rarely causes issue except for the typical distribution of work-load. In our students’ comments, we noticed much less of a naive student analysis of working in communities than are typical. For instance, students, in spite of elevating deliberative dialogue work as the most important action for sustainability, provided sophisticated analyses of its drawbacks and challenges. Our

students' ability to speak to these challenges signifies a deep involvement and skill-level with community engagement and the challenges of working in sustainability.

- “People don't think their contribution matters, especially in the case of climate change.”
- “People don't like group work”
- “Some may think the work has no impact”
- “Lack of interest”
- Some people might “not like to communicate and have their own personal way to display their message.”
- “People might think there are more important tasks and issues”
- sustainability is more difficult to promote than I had expected.”
- “to influence change it will take time.”
- “incentive – it won't help me immediately”
- “Misinformed – been given incomplete or incorrect information”

We also noticed that students were able to move beyond simply articulating the value of teamwork, but also were able to talk about their skill development. This is the most exciting result. We want students to graduate with knowledge, but more important we need them to graduate with skills that will make them valuable to companies, agencies and society in general.

- “It helped me learn about new ways and methods of sustainability”
- “It helped gain exposure about new learning in team building.”
- “I believe working in a setting like this is more valuable than any other form of education. It basically applies skills and knowledge while also giving hands-on learning. Trial and error.”

Discussion

The two faculty from science and education who engaged in this collaboration had talked for some time about the potential value of combining public deliberation and sustainability. Both were encouraged by the student survey outcomes. Students gained valuable lessons in the collaborative activity. Many students commented on the value of getting input from diverse perspectives. This would not have been accomplished if students hadn't had the full length of the semester to have structured discussions and been required to bring in outside experts to discuss their plans with. Students were able to experience and articulate the true experience of trying to complete a project that had been developed by an entire group. Students acknowledged that it can be difficult to get others engaged and since it is not a class “cookbook” activity and since there was no determined instructions about how to accomplish this specific project. Finally, students were able to see how such an activity mimics the real-life skills they will need such as in depth collaborations and trial and error. The collective skills the group got exposure to included: investing time in a team and a team project, acknowledging difficulty, getting feedback from

experts on an idea and modifying ideas and finally learning to communicate so as to effectively navigate and create products in groups.

The field of sustainability education is pedagogically unique. Students need to learn content and skills that will be required to solve complex environmental and social problems. The field of sustainability has begun to document what works pedagogically. It is not surprising that first year students in sustainability-based living learning communities feel more connected and engaged (Lewis et al. 2019). It is also not surprising that project-based learning works well in sustainability (Everett et al. 2018) as it is well documented as an important pedagogical tool overall. What is specific to sustainability is the knowledge and skills of how to make change in their own community and the realization that this is a process and that it takes time and patience. There is clear evidence that community university partnerships can create systemic sustainability change in an area (Forbes 2019). It is also obvious that students must master the skill of community collaboration, but the question of how they learn this is difficult to answer. The work of Burns and colleagues (2019) tackled the learning outcomes for those in sustainability. They argued that the students in sustainability are going to help make holistic change and we need teaching activities that are “participatory, experiential and relational” (Burns et al. 2018). Inclusion of public deliberation in a sustainability course created an experiential practice that was both participatory and relational.

While more sustainability courses across many of our colleges and universities would benefit from the inclusion of deliberative practices, this approach often requires support for faculty who may have no experience with public deliberation or its inclusion in curricula. The University of Houston – Downtown Center for Public Deliberation (UHD CPD) (www.uhd.edu/cpd) is a center that works with faculty across institutions to support them in incorporating these approaches in ways that are culturally appropriate to their institution. Additionally, the UHD CPD is able to provide workshops as well as collaborative meeting spaces, whereby faculty can meet and exchange ideas around their innovative, pedagogical practices.

Public deliberation is a valuable tool for any academic field where students need to learn to work in diverse groups and navigate difficult tasks. Sustainability is a particularly well-suited discipline to practice public deliberation because of the tensions created in the sustainability triangle between social, economic and environmental forces. To develop solutions that address the concerns of entities at the points of these triangles students will have to develop efficient communication skills. One of the important themes taught in this Fundamentals of Sustainability (SUST 3302) course is theory of the *Tragedy of the Commons* and how the tragedy of people overusing (or polluting) a resource until it is gone. Nobel prize winning economist Elinor Ostrom argued that protecting the commons comes when the community is given education and power over their own community resource (Ostrom, 1990). What better way to teach this important concept in sustainability than to use the tools of public deliberation and create opportunity for students to make collective change in their own communities as a class action plan?

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References

- Burns, H., Kelley, S. and H. Spalding. (2018). Teaching Sustainability: Recommendations for best pedagogical practices. *Journal of Sustainability Education*, 19, 16 pages. ISSN:2151-7452.
- Delli Carpini, M. X., Cook, F. L., Jacobs, L. R. (2004). Public deliberations, discursive participation and citizen engagement: A review of the empirical literature. *Annual Review of Political Science*, 7(1), 315-334.
- Drury, S. A. M. (2015). Deliberation as communication instruction: A study of climate change deliberations in an introductory biology course. *Journal on Excellence in College Teaching*, 26(4), 51–72.
- Everett, J., Riddell, W., Moore, C., Valentine, S. and R. Krchnavek. (2018). Client-oriented project based learning using building audits. *Journal of Sustainability Education*, 19, 18 pages. ISSN:2151-7452.
- Forbes, S. (2019). O Grows, community-based food systems and the sustainability compass. *Journal of Sustainability Education*, 21, 15 pages. ISSN:2151-7452.
- Lewis, R., Barile, B, Drennen, T. and R. Beutner. (2019). Using sustainability education to enhance a sense of belonging and community among first-year college students. *Journal of Sustainability Education*, 19, 13 pages. ISSN:2151-7452.
- Meadows, D. 1999. Leverage points: Places to Intervene in a System. *The Sustainability Institute*. Retrieved December 23, 2020, from <https://donellameadows.org/>
- Nabatchi, T. (2012). An introduction to deliberative civic engagement. In T. Nabatchi, J. Gastil, G. M. Weiksner, M. Lieghninger (Eds.), *Democracy in motion: Evaluating the practice and impact of deliberative civic engagement* (pp. 3-17). Oxford: Oxford University Press.
- The Natural Step. (n.d.). Retrieved December 23, 2020, from <https://thenaturalstep.org/>
- Ostrom, E. (1990). *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge University Press. 280 pages.
- Weasel, L.H., & Finkel, L. (2016). Deliberative pedagogy in a nonmajors biology course: Active learning that promotes student engagement with science policy and research. *Journal of College Science Teaching* 45 (4), 38 – 45.

Author Thumbnail photo (Morano)



Author Thumbnail photo (Lawrence)



Story Thumbnail photo –This is a photo of UHD students deliberating with community members.

