ARTICLE

The social lab classroom: wrestling with—and learning from—sustainability challenges

Danielle Lake, Hannah Fernando, & Dana Eardley
Liberal Studies Department, Grand Valley State University, 241 Lake Ontario Hall, Allendale, MI 49401 USA (email: lakeda@gvsu.edu; hfernando94@gmail.com; eardleyd@mail.gvsu.edu)

Unlike the traditional disciplinary approach to research and problem-solving still common in higher education, this article explicates and recommends an interdisciplinary, holistic pedagogical approach that takes seriously the interconnectedness of our wicked social sustainability challenges (e.g., poverty, global climate change, food access, among others). We argue that educators can better prepare students to tackle such wicked problems by requiring they engage with locally based problems connected to large-scale systemic challenges. By discussing the design and outcomes of the course “Wicked Problems of Sustainability” from both the students’ and instructor’s perspectives, we seek to extend and enhance effective pedagogical strategies. As a laboratory for sustainability education and innovation we have developed a transdisciplinary, community-engaged, upper-division undergraduate course that engages students in participatory research on the inextricably linked dimensions of social sustainability. Collaborating with community partners to work across networks, disciplines, and institutions, students have the opportunity to ameliorate real problems in the local community. In doing so, the course confronts students and the instructor with a series of robust challenges from intensive collaborations, to logistical and time-management dilemmas, to real-world execution issues. This article details the obstacles associated with messy inquiry, participatory research, and community engagement and provides recommendations for overcoming them.

KEYWORDS: social sustainability, education, wicked problems, pedagogy, innovation, community

Introduction

Efforts at increasing our social sustainability (SS)—at establishing systems, products, and services designed to better the overall health and well-being of all community members for the long-term—are frequently stymied by the “wicked” nature of our collective problems. For instance, poverty, climate change, and food insecurity, as wicked social phenomena, are dynamically complex, interdependent, high-stakes dilemmas with no simple or evident definition (let alone any simple or obvious solution). These problems evolve with high levels of uncertainty in situations where both action and inaction carry serious and long-term consequences (Rittel & Webber, 1973; Salwasser, 2004; Brown & Lambert, 2013). The need to act and act now must be grounded in a general stance of epistemic humility and openness, a willingness to return and reconsider, revise, and redo. According to SS scholars, when addressing such challenges we must be cognizant of how our actions affect issues of justice and equity, infrastructure, governance, and capital (Cuthill, 2010). For instance, justice requires that we develop infrastructure and employ capital so as to meet the basic needs of a community. We should similarly govern so as to ensure access, opportunity and capacity, health and security, diversity and inclusion, as well as overall well-being (Boström, 2012); and we should do so in an inclusive manner across generations (Dujon et al. 2013). Yet our dominant educational practices in the United States (focused on linear, disciplinary progression) and common abstract pedagogical strategies (focused on narrow problem solving) fail to prepare students with the tools to collaboratively and iteratively act on wicked problems (WP). Therefore, it is imperative that educators do more to empower students to become effective “change agents” (Svanstrom et al. 2008).

With these concerns and commitments in mind, this article describes lessons learned from a specific undergraduate course entitled “Wicked Problems of
Sustainability.” As a transdisciplinary, community-engaged, upper-division undergraduate course at Grand Valley State University, this course focuses on fostering collaboration, integration, and problem-solving by bringing interdisciplinary teams of students together with community partners seeking to tackle local sustainability problems.\(^1\) Topics in the course range from WPs to design thinking, environmental justice, food systems, policy, and citizen science (Lake & Fauvel, 2015). Students study local SS challenges, thus far having addressed issues of food insecurity and urban farming in the inner city, sustainable funding for local nonprofits, K–12 student-lunch policies, sustainability education programs, local farmers’ markets, along with issues of food waste and access, among a host of other projects.

The course was offered for the first time in the fall of 2013, again the subsequent semester, and most recently in the winter of 2015 (undergoing three iterations and substantial revisions). Paralleling the evolving nature of the course described, this article evolved through deep and sustained dialogue among the teaching apprentice (and a graduate of the inaugural course), an alumna of the course’s most recent iteration, and the designer and instructor. The struggles emerging from each version of the course confirmed both the need and value of working directly with students to iteratively and collaboratively revise its various dimensions. Through our experiences researching, designing, teaching, taking, and assisting in “Wicked Problems of Sustainability,” we address the following two questions: How can we better tackle SS challenges within undergraduate courses? What pedagogical methods can help students respond to interdependent, high-stakes systemic problems? In answering these questions we show how the strategies emerging from our collective experiences align with and extend sustainability teaching practices recommended in the literature. We ultimately conclude that courses designed to address our social sustainability problems can and must do more to foster epistemic humility, “creative confidence” (Kelley & Kelley, 2013), and “open-minded advocacy” (Shrader-Frechette, 2002).

We begin by laying out the methods used to arrive at our recommendations and then briefly describe the nature and scale of wicked problems. We then summarize the underlying framework supporting the course, its learning objectives, and the assignment and assessment strategies found to be most valuable (for a full list of assessments see Table 2). In place of an exhaustive chronological description of course content, we next highlight the value of the key pedagogical strategies employed, specifically detailing the importance of a problem-framing and reframing process, the necessity for revision and iteration, and the importance of asking students to disseminate their work in the real world. Following these recommendations, we candidly discuss the obstacles involved in such a pedagogy and its potential to contribute to tipping points in local sustainability efforts. Finally, we offer possible measures for judging the “success” of such courses. By providing a flexible framework, a set of tools, and a diverse set of perspectives on those tools, we ultimately hope to help instructors and their students collaboratively tackle SS challenges within their own fields and communities.

Methods

As a case study, this article analyzes the course “Wicked Problems of Sustainability” using a holistic, single-case design and a wicked-problems framework (Yin, 2012; Lake et al., 2015). The authors—the designer of the course, the teaching assistant, and a recent student alum of the course—used qualitative research methods to study the merit of the pedagogy described. This included analyzing student findings, reviewing student and community-partner surveys and anonymous end-of-semester evaluations, observing student interactions during course time and team meetings, and conducting ethnographic interviews.\(^2\) Interviews with students and community partners were largely unstructured, resulting from anecdotal discussions during office hours, community-partner meetings, and volunteer hours in the community. Following discussions with students and community members, we recorded comments by summarizing key themes and consistent concerns. In addition, we elicited student perspectives through various assignments throughout the semester, a final synthesis essay detailing student insights on the course, self- and peer-assessments, and publication of student-team action plans in an open-access ScholarWorks main and satellite campuses, GVSU currently enrolls approximately 25,000 undergraduate students.

---

\(^1\) Grand Valley State University (GVSU) is a public university committed to combining the ideals of liberal education with practical, professional learning. Situated in the western part of Michigan, the main campus is located just outside of the Grand Rapids metropolitan area in a rural farming community. Across its

\(^2\) The findings are derived from reflections on normal classroom activity and are exempt from Internal Review Board oversight under category one: normal classroom activities. In addition, students have signed a release form agreeing to the publication of the findings.
repository. The findings, described below, were then compared to prominent themes emerging from a review of the literature on wicked problems, social sustainability, and pedagogical practices surrounding change-agent skills. Aligned with recommendations emerging from systemic-action research, our collaborative, hands-on approach allowed the authors to assess the different perspectives involved in this course as the semester unfolded (Burns, 2014). Given that interventions on local wicked problems are likely to yield unforeseen or unintended consequences, these emergent research practices encouraged reflection on the effectiveness of the course in real time. As we show next, opportunities for iterative interventions are essential for ameliorating dynamic wicked problems.

**Scaling Wicked Problems**

Whereas simple problems are easily defined and amenable to replicable, formulaic interventions, complex problems often involve high levels of uncertainty, undergo change over time, and require the coordination of a wide range of expertise (Snowden & Boone, 2007). As the intricacies increase, we see that the problem is interconnected with many others, that the stakes have risen, and that the level of disagreement among stakeholders has intensified (Brown et al., 2010; Brown & Lambert 2014). As we move along this sliding scale, we reach a wicked level of messiness, finding ourselves confronting “mega-crisis” like the healthcare quagmire in the United States or the 2007–2008 housing crisis and subsequent global recession (Alpaslan & Mitroff, 2011). At this level, problems resist standard efforts designed to yield final, ideal solutions (Rittel & Webber, 1973; Norton, 2005). Table 1 illustrates this continuum of complexity and wickedness along seven factors.

Juxtaposing Table 1 with SS literature shows that efforts to move social sustainability forward have been stymied by vague and fluid definitions of key terms, differences in how various stakeholders measure success, numerous unknowns, sporadic and fragmented funding, and limited stakeholder support (Factors 1, 2, and 3 in Table 1) (Cuthill, 2010; Boström, 2012). Stakeholder values are not only frequently in tension, they are often diametrically opposed under the highest of stakes (Factors 4 and 5). For instance, while we fail to meet the most basic needs of many across the globe, we simultaneously encourage extreme, unsustainable consumerism and waste (Dujon et al., 2013). Aspirations for triple-bottom-line “wins” often ignore unavoidable, on-the-ground tradeoffs (Fitzpatrick, 2011).

Both the SS and WP literature warn readers: we must give up on the idea that technological innovation or expert intervention is enough (Factor 6 in Table 1). Rather, inherently context-dependent and emergent SS requires broad social inclusion, demanding that we continuously uncover and weigh the merit of our own and others’ assumptions, values, and goals (Fischer, 2000; Wynne, 2007; Hiedanpää et al. 2012; Dujon et al. 2013). Furthermore, both SS and WP scholars emphasize that the implementation of effective processes in one region cannot simply be replicated in

---

Table 1: Contrasting Simple, Complex, and Wicked Problems.

| FACTORS   | SIMPLE                        | COMPLEX                   | WICKED                              |
|-----------|-------------------------------|---------------------------|-------------------------------------|
| 1. Definition | Easily defined             | Messy                     | Chaotic                              |
| 2. Variation    | Static and linear          | Dynamic and emergent    | Host of “unknowns”                   |
| 3. Learning Process | Replicable answers     | No “one” formula; no guarantees | Cannot replicate; inherent tradeoffs |
| 4. Values          | Alignment                   | Tension                   | Conflict                             |
| 5. Stakes           | Low                         | Higher                    | Highest                              |
| 6. Intervention   | Lay intervention            | Expert and technological intervention helpful | Technological innovation and expertise *not* enough |

---

Footnotes:

3 Both sets of literature also highlight current struggles to cooperate regionally and globally, systematically and comprehensively. Failure to cooperate means general lessons learned from local efforts often go unreported.
another (Factor 7). Since our social lives are comprised of vastly differing habits, customs, and laws, a flexible SS framework is necessary (Boström, 2012). We need new narratives; we need to consider what processes and institutions will foster “mental and emotional models for experiencing a good life for everyone”; we need, that is, to expand our ethical framework, develop a greater capacity for change, and create broad participatory practices (Lorek et al., 2012). We need new narratives; we need to consider what processes and institutions will foster “mental and emotional models for experiencing a good life for everyone”; we need, that is, to expand our ethical framework, develop a greater capacity for change, and create broad participatory practices (Lorek et al., 2012). Since actors seeking to develop more socially sustainable systems and processes confront WPs, Cuthill (2010) argues that we cannot fruitfully segment our SS challenges into university disciplines. Indeed, even a cursory overview of these fields illuminates the urgent need for the recommendations that follow, for “engaged scholarship, a collaborative and integrative educational model, and more transparent and participatory democratic” practices (Lake & Fauvel, 2015). As we show next, the flexible framework we developed for this course encourages more comprehensive and iterative problem framing from which more equitable student-with-community actions are likely to emerge.

The Framework

Where to Begin? Issue-Framing, Re-Framing, and Re-Re-Framing…

As the course was focused on WPs, students ultimately wrestled with and enacted various definitions of sustainability. In general, students were challenged to consider how we can live “in such a way that there are enough resources to live well in an alive, diverse, thriving environment—indefinitely” (Jeavons, 2012). In large measure, the value of the course came from not only studying, but also enacting, these various definitions.

The overarching learning objectives of the course asked students to:

1. Identify and apply the WP literature to the course topic;
2. Study a complex local problem through different disciplinary and value lenses;
3. Facilitate deliberation with stakeholders on possible action plans;
4. Synthesize research with deliberative conclusions and propose action efforts;
5. Engage in local action; and
6. Disseminate the results.

These objectives build upon the five key sustainability competencies synthesized by Wiek et al (2011) as well as in Marzano & Kendall’s New Taxonomy of Educational Objectives (2008). For instance, the first and second objectives move students quickly through their first three educational objectives, requiring that they retrieve, comprehend, and analyze the local issue through a WP lens. As authentic tasks necessitating investigation into systems thinking and anticipatory competencies, they align knowledge acquisition with its use. In practice, these first two objectives prevent narrowly framed, inflexible problem definitions, which are likely to leave us blind to multiple facets of the problem and mistaken about the assumptions under which others are working (Norton, 2005; Thompson & Whyte, 2011).

The third and fourth learning objectives—that students present action plans, facilitate deliberation on their merit with local stakeholders, and analyze their conclusions—require that students specify their goals and clearly articulate their values (metacognitive objectives highlighted by Marzano & Kendall, 2008). The fifth objective, specifying that students engage in local action, entails experimental problem solving and decision making. The final objective, that students publically disseminate the results of their work, encouraged the examination of the overall merit of their efforts through both public forums and scholarly presentations and publications. These systemic engagement practices required issue framing and reframing. They also inspired students to seek out on-the-ground stories from community members, experts, and other stakeholders, observe—if and when appropriate—facets of the problem first-hand, and share the insights gained, mind-mapping the dimensions of an issue. Mind maps, like rich pictures, soft systems modeling, and other tools, ask students to visualize their understanding of complex issues as they study them (Burns, 2014; Morris & Warman, 2015).

---

4 As Werkheiser & Piso (2015) note, sustainability requires actors who are willing and able to do the work of sustaining.
In general, these practices furthered students’ collective understanding and, where possible, helped them to integrate across perspectives. In recent years, SS scholars have consistently argued that such engagement work is the critical first step toward just and equitable sustainable development (Ling et al. 2009; Cuthill, 2010; Dujon et al. 2013).

Through these objectives, students began to acquire the framing and tools from which they could reconstruct—or map—aspects of SS situations. For example, the first two sections of the course asked students to confront issues of access to local and healthy foods for school-age children. The WP framework required students to consider the varying degrees of complexity. To begin, students explored the wide-ranging list of individuals invested in and affected by the problem that they were seeking to address, as well as their conflicting perspectives, implicit assumptions, and values. Students also explored the uncertainties involved in the issue, the high stakes, and the need for (and limitations of) various forms of expertise. They sought out local narratives, expert perspectives, and organizational knowledge, speaking with school-age children, teachers, and administrators, as well as nutritionists, farmers, distributors, food-justice advocates, and, in one case, a food-service director.

The action projects that emerged from the learning outcomes fostered epistemic humility, “creative confidence,” and “open-minded advocacy,” building students’ capacity to “span boundaries” (Shrader-Frechette, 2002; Kelley & Kelley, 2013; Ramley, 2014). For example, after engaging stakeholders from across these disparate perspectives, one student team concluded that “it is in the deep reality of a community that we…connect with one another…and make progress with the messy, intricate, wicked problems of that neighborhood” (Fernando et al. 2015). Since epistemic humility, creative confidence, and open-minded advocacy are essential for effectively ameliorating our large-scale systemic sustainability problems, intentionally encouraging their development in students is critical (Kolb, 2003; Alpaslan & Mitroff, 2011). For example, epistemic humility is necessary for open listening across differences, lifelong learning, stakeholder collaboration, and integrative outcomes. This stance encourages individuals to begin with “the particularities of a situation in order to get in sync with it,” instead of beginning with “prescriptions” already in mind (Frodeman, 2014).

Creative confidence, by contrast, can prevent the move from naive optimism into apathetic cynicism that often accompanies education on wicked problems. To foster this confidence, students considered how their own education, experience, and skill sets were valuable to their team and their community work. Open-minded advocacy promotes a more widely inclusive search for information-at-play, motivates public engagement, and encourages careful reflection on the uncertainties at hand (Shrader-Frechette, 2002).

Scholars and practitioners have developed a number of methods and facilitation techniques to encourage these mind-sets. One such method is “design thinking,” an iterative, project-based, and collaborative problem-solving process that seeks to move students from a predetermined state of mind about the situation that they are confronting, toward a more open stance of perplexity. The process begins with empathetic listening, and this—as one student team wrote in their analysis—was integral to their efforts to “come alongside those already working with the community.” It was their community engagement that ultimately led them to see “the transformative power of this [nonprofit gleaning] initiative” and “to find a means to support their efforts” (Cook et al. 2015). Ethnographic interviewing, mind-mapping, and stakeholder mapping (among many other processes recommended within this method) helped students wrestle with (instead of avoid) the complexities of WPs.

Taken together, these learning outcomes provided students with opportunities to integrate their experiences with their education and then—in collaboration with others—apply their findings in the community. Such goals better prepare students to take on the role of an integrator and “boundary spanner” (Ramley, 2014) while aligning with outcomes identified as essential within the sustainability literature (Svanstrom et al. 2008). Collaborative, project-based learning and participatory action are the
means by which students met these objectives and iteration was the path by which their projects unfolded. To support them in developing these skills and mind sets, we designed a host of scaffolded activities, practices, and projects. Table 2 provides a comprehensive overview of course assignments. The table aligns these assessments with both the course learning objectives and the sustainability competencies promoted within the literature.

**Iteration**

Iterative methods are, the WP literature confirms, essential to effectively addressing wicked problems, since any conclusion is likely to be partial and any action implemented to have unintended consequences (Norton, 2005; Ramley, 2014). That is, intervention efforts are, at best, partially wrong and, at worst, entirely mistaken. Engendering this fallibilistic and flexible mindset has been particularly challenging. We have found that students often begin the semester with a plan of action in mind and are reluctant to subject this initial vision to critique and revision. For example, seeking to help a local nonprofit gleaning initiative promote their cause and transport their produce in the winter of 2015, one team posited the creation of a mobile food bus, simultaneously expressing apprehension about sharing this vision with their community partner and thereby exposing it to criticism. However, this critique was ultimately essential to their plan. The team had not fully considered simple, real world constraints nor the potential drawbacks of their initial idea: a bus would be difficult to maneuver through the initiative’s target neighborhood; it also requires a special license to drive and a special parking space. After overcoming their aversion to criticism, the team was able to integrate the expertise of the nonprofit, ultimately allowing them to create a more practical and implementable proposal: a mobile food cart. With the WP recommendations and this narrative in mind, we advocate that courses support students work on real world problems through iterative feedback loops, providing them with ample opportunities to revise. As students seek to address WPs, it is helpful to emphasize that various levels of initial failure are to be expected and revision rewarded.

There are, in fact, a number of methods to encourage collaborative and iterative problem solving, including strategic doing, Kolb’s experiential learning, Brown & Lambert’s collective learning for transformational change, and design thinking. These processes generally require students to consider what they could do, then what they should do, what they will do, and when they will do it.8 These processes encourage visualizing, enacting, and testing various problem definitions and interventions, ultimately inspiring a wider range of creative ideas. Since iteration is a particular challenge, and since it requires consistent opportunities to learn-by-doing, we next discuss how we incentivized reflective action throughout the semester.

**Reflect, Act, then Reflect and Act Again**

As students’ action plans emerged, they shared their plans with key stakeholders and begin to implement—and thus test—aspects of their ideas. For instance, with their revised vision of a mobile food cart in mind, this group of students sought out engineering faculty to discuss the merit of various cart designs. Weekly “seven-seven” commitments to help students move through an iterative and action-oriented learning process included conducting traditional research, interviewing community stakeholders, canvassing the neighborhood, attending community events, prototyping their team plan, crafting promotional media services, devising K–12 curricula, designing community events, and so forth. Team members returned to the next class session to discuss the results of their actions and to strategize about the most fruitful next steps. These seven-seven requirements turned big ideas into concrete, manageable weekly actions subject to real-time reflection. In essence, these commitments took the demand for cautious action that “preserves options for continual course correction”

---

8 These processes also tend to foster a broader understanding of what counts as legitimate knowledge, requiring that students not simply conduct traditional academic research, but also seek out diverse narratives by listening to community-member stories and institutional perspectives. Students in the second iteration of the course, for instance, ultimately shifted their efforts after receiving direct feedback from school-age children about the origin of their food. Asking elementary school children to talk about and illustrate their understanding of the food cycle led to the insight that local school children often do not realize that food comes from the land. These insights shifted the nature of the curriculum students wanted to design (Haapala et al., 2014). For example, one team in the third iteration of the course researched crowdfunding methods and best practices for their nonprofit partner, ultimately putting together a how-to pamphlet on crowdfunding. When the students shared their work at the final dialogue event, several nonprofits and community members in the audience expressed interest in gaining access to their findings, recommending the team widely disseminate the pamphlet (Cook et al., 2015).
The weekly movement among collaborative brainstorming, action, and reflection also motivated the teams to rapidly prototype their ideas within the limitations of one semester, encouraging accountability and counteracting procrastination. Since a single semester is a relatively short period for addressing the objectives outlined in the methods and framework section, the use of practical, weekly accountability measures increased the quality of the projects that were ultimately submitted.

Where to End? Community Dialogue
At the end of the semester, students shared their efforts with a wide array of stakeholders from across the university and the community. This exercise bridged the divide between the production of ideas and their use, helping to develop the partnerships necessary for sustainable change (Lake & Fauvel, 2015). Students presented their work and elicited feedback by 1) framing the issue that they were seeking to address, demonstrating that they had a comprehensive understanding of its wicked dimensions, 2) highlighting the research they conducted, and 3) describing the work they chose to pursue and the reasons for it (making clear their team values and goals). They also detailed 4) the concerns they had, 5) the constraints they faced, and 6) the resources they needed. By inviting a wide range of community stakeholders and experts, students could then elicit feedback that was critical to the future implementation of their projects. In general, we found that this final dialogue event was rewarding on a couple of fronts, creating a celebratory space for students’ work and fostering networks essential for effective and collaborative local action.

Table 2 Course Assessments.

| Assessments               | Description                                                                 | Objectives                                                                 | Competencies               |
|---------------------------|----------------------------------------------------------------------------|----------------------------------------------------------------------------|----------------------------|
| Point-of-view Presentation| Articulate how experiences, disciplinary training, skills, and values contribute to one’s perspective on issue. | Study different disciplinary and value lenses | Systems-thinking (ST), Normative, Interpersonal |
| Team Charter              | Align vision, goals, and roles; communication plan; conflict resolution strategy. | Integrate disciplinary and value lenses | Anticipatory, Normative, Strategic, Interpersonal |
| Team Guide (Agenda and Notes) | A system for collaboration, capturing ideas, integrating information. | Reflect on actions; analyze and integrate findings | ST, Anticipatory, Normative, Strategic, Interpersonal |
| Seven-seven Commitments   | Weekly team-member action commitments and reflections. | Collective action and reflection, accountability, time management | Anticipatory, Normative, Strategic, Interpersonal |
| Midterm                   | Essays demonstrating comprehension and application of issues. | Identify and apply WP literature | Anticipatory, Normative, Strategic, Interpersonal |
| Community-Partner Presentation and Dialogue | Draft visions detailing: What is at stake? What could and should be done? How it could be done? | Disseminate ideas and revise findings | ST, Anticipatory, Normative, Strategic, Interpersonal |
| Team Evaluations          | Evaluate collaborative efforts in relation to charter; revise policies and actions | Reflection, feedback, and improvement | Normative, Strategic, Interpersonal |
| Team Poster Presentation  | Visualize and talk about action efforts, elicit feedback | Present findings and facilitate deliberation. | ST, Anticipatory, Normative, Strategic, Interpersonal |
| Team Project Analysis     | Formally summarize efforts, open-access publication | Disseminate findings | ST, Anticipatory, Normative, Strategic, Interpersonal |
| Synthesis Paper           | Synthesis of the course | Reflect on lessons learned | ST, Anticipatory, Normative |

Students presented their work and elicited feedback by 1) framing the issue that they were seeking to address, demonstrating that they had a comprehensive understanding of its wicked dimensions, 2) highlighting the research they conducted, and 3) describing the work they chose to pursue and the reasons for it (making clear their team values and goals). They also detailed 4) the concerns they had, 5) the constraints they faced, and 6) the resources they needed. By inviting a wide range of community stakeholders and experts, students could then elicit feedback that was critical to the future implementation of their projects. In general, we found that this final dialogue event was rewarding on a couple of fronts, creating a celebratory space for students’ work and fostering networks essential for effective and collaborative local action.
plans once established. These obstacles are detailed next.

**You Think You Know, But You Don’t Know**

Confirming the value of experiential learning, it was not until students put the theories and methods surrounding WPs into practice that they began to viscerally appreciate the nature of social issues. The process of engaging in collaborative, local action made it quite clear why society is struggling to progress on complex, interdependent problems of sustainability. To foster collaboration among diverse perspectives, students were placed in five-person interdisciplinary teams representing at least three different majors and two different colleges from across the university. For instance, one of the teams was comprised of students majoring in natural resource management, sociology, environmental studies, education, and entrepreneurship. Not only were students joined with one another, they were also partnered with a nonprofit organization seeking to address local sustainability challenges. While early collaborative partnerships were helpful in providing context for brainstorming and implementing action plans, with no similar previous educational experiences, most teams struggled to begin.

Through this confusion, students realized that addressing their collective problems required that they first address each other. Furthermore, effective collaboration requires more than understanding the relevant disciplinary perspectives of each team member; it entails that they acknowledge one another’s positionality: the values, personalities, motivations, learning preferences, and organizational practices each individual brings with them. Thus, initial point-of-view presentations, team charters, as well as commitment to in-class team time, a team guide, and evaluations all helped students to foster normative and interpersonal competencies that experts say are needed for this work (Marzano & Kendall, 2008; Ferkany & Whyte, 2011).

Returning to the “Glean Ride” example illustrates this point. In being forced to revise their initial vision from a mobile food truck that could collect and distribute freshly gleaned produce to target neighborhoods in the city, the team concluded that, “our most exciting idea...simply was not a viable option... given the overall cost to operate and to insure, as well as the need for a special operator’s license and location for parking” (Dorking et al., 2015). They discovered it was imperative to understand the perspectives of project stakeholders in order to make real-world progress. Coming to know one another and their community partners was ultimately crucial to the development of trust and camaraderie, which was necessary for uncovering assumptions, working effectively across disciplinary and personality differences, building networks in the community, integrating across differences, and prioritizing local action (O’Rourke & Crowley, 2013).

**Motivating Action and Reflection**

Collaborative and interdisciplinary teamwork was also effective because students entered the class with vastly ranging motivations and commitments to the issues engaged in the course. For instance, they studied the wicked dimensions of economics, politics, food, culture, the environment, sustainability, and water in addition to immersing themselves in various democratic practices, technologies, science and ethics, policy issues, network analyses, and collaborative problem-solving processes. As assignments escalated and the semester unfolded, a lack of ownership, a fear of creativity, and a reluctance to “act” was noted across a number of student teams. Upon reflection, their motivation seemed contingent upon an understanding of 1) the content of the course, 2) the local issue being addressed, and, most importantly, 3) how the content and the issue are relative and important to each of us. That is, while students were exposed to literature clearly exemplifying the urgent need to address WPs and to a host of tools for ameliorating these issues, making sure they invested time in reflecting upon the material’s relevance proved difficult. Verifying these insights, research shows that respecting student perspectives, demonstrating the practical relevance of their learning, and integrating student experiences into the course tends to motivate transformational learning (Wlodkowski, 2008). Thus, instructors should emphasize the wider social relevance of the issues, but also consistently connect (and reconnect) students to the systemic issues they are seeking to ameliorate.

**Learning in the “Real World”: Working with the Community**

Rather than developing ideas and concepts in the classroom setting and then attempting to “apply” them in the community (a one-way flow of knowledge production to action), in our class students were partnered with a community organization from the
beginning. Forming these relationships early encouraged a “working with” model, grounding students’ efforts in the context of the local situation. This option better fosters reciprocity as well as more comprehensive and socially aware action plans (Lake, 2014).

While at first intimidating to co-develop new ideas with community leaders, doing so can lead to more realistic and comprehensive plans as well as deeper learning than is likely when plans are seeded within the classroom’s narrow confines. These early partnerships can be effective because nonprofit directors and community leaders can articulate a number of areas in which they could use help, frame initial visions for effective interventions, and make the issues the course addresses very real, contextualizing the work and its value. For instance, one community partner, hoping to develop a self-sufficient farm to foster sustainable and healthy farming practices and communities in western Michigan, said he could use help developing partnerships with other organizations, assessing the community’s needs, and creating business plans that incorporate stakeholders’ perspectives. This initial list of possible entry points provided a broad structure from which students could then brainstorm. While community-partner prompts for aid narrow the scope of possible action plans, broad recommendations from local stakeholders can still give each student team ample freedom to formulate a plan of action that aligns with their own hopes, values, and goals.10

**Following Through: Learning-by-Doing**

In trying to develop and implement an integrated plan of action, teams experienced both constructive and destructive collaborative processes. Increasing both the number of stakeholders involved in the project (e.g., the professor, the nonprofit director, community members, local experts) and the creative license afforded to students increased their collective anxiety, leading to worries that ideas were “off the mark.” With conflicting goals and amorphous objectives, “success” becomes a tricky and daunting target. Noting this very issue, scholars suggest that overcoming fear, denial, and resistance is key to effectively managing WPs (Alpaslan & Mitroff, 2011).

While resistance may be common, it is also troubling. The classroom can be an incredibly effective and safe space for practicing collaboration on WPs, requiring students to tackle their fear of failure head-on before they move to engaging their own professional realm. To some extent, team structures and deliberative processes help them acclimate to the messy nature of this work. By selecting a team leader, breaking up larger tasks into manageable and measurable weekly actions, and coordinating regular meetings, students experience tangible progress.

An anonymous end-of-semester survey confirmed that these facilitation techniques were effective at encouraging self-efficacy. For instance, when asked whether the community partnerships helped them understand how the issues of the course applied to real-world problems and situations, every student answered affirmatively. They all also confirmed that the participatory engagement requirements helped them to recognize that issues can be viewed from multiple perspectives, improved their communication and collaborative skills, and increased their awareness of cultural differences. All but one student confirmed that community work enhanced their ability to evaluate real-world programs and processes. Finally, all but two of the eighteen respondents also agreed that the community partnerships were valuable, that they were more likely to participate in community work because of this course, and that they would enroll in another course requiring similar participatory practices on real-world problems. Given the often overwhelming and depressing, intractable nature of our SS challenges (i.e., that they can often be categorized as wicked), we suggest these responses are a limited but powerful affirmation of the practices recommended within these pages.

**Defining Success: Contributing to “Tipping Points”**

Given the enduring and dynamic difficulties surrounding these problems, there is a tendency to question the ultimate merit of this experiential,
community-engaged pedagogy at numerous points throughout its three iterations. However, the nature of WPs encourages us to question traditional perspectives on what counts as effective. According to service-learning expert Barbara Jacoby (2010), we can judge the outcomes of community-engaged courses by considering whether students have 1) grown “to understand the interdisciplinary nature of problems and solutions,” 2) learned “about the complexity of the social fabric,” and 3) come to see “how they can be part of the solution instead of part of the problem.” The pedagogical strategies and methods employed in the course moved students along a sliding scale toward all three of these goals.

In addition, the course offered students the opportunity to influence local issues and to meet real needs, to develop community partnerships, and to establish networks potentially valuable to their life after graduation. On this front, such courses can be an additional factor in moving toward local tipping points by drawing in “supporters”; they can contribute to what becomes a “critical mass,” replacing “the dominant attractor of the status quo” (Burns, 2014). These long-term potential of these efforts should not be easily discounted or quickly dismissed. Tipping points depend on using an iterative and participatory process of reflective action subject to “real time” assessment and adjustment and “rooted in relationships” (Burns, 2014). In our view, the pedagogical strategies recommended here are consistent with these aims.

Using a separate metric culled from the literature on WPs, we recognize a similar need for judging the relative success of student efforts. In this metric, we can weigh the value of such courses by reflecting on how students’ final analyses 1) comprehensively frame the issue they seek to address and 2) acknowledge the inherent conflicts and uncertainties in their work. We should also consider 3) who is involved in—and left out of—the planning process, 4) what types of evidence are examined, 5) whose perspectives are influenced, and 6) how reality has been (or could be) changed because of student efforts (Turnpenny et al. 2009). Judging the effectiveness of the pedagogy on either rubric leads to the conclusion that this course is not just about the application of particular methods, but is more broadly about character building. According to Frodeman (2014),

11 As one commentator on this work at a recent conference noted, it may often be the case that our efforts to stymie many of our public crises are stalled by “wicked” people (those who hold narrow, self-serving agendas; unexamined, convenient assumptions; contradictory and incomplete knowledge; as well as who lack participatory virtues and skills), not WPs.

12 The authors also believe universities should do more to provide the space, opportunity, and incentives for instructors to pursue messy, community-engagement practices in their courses.

Conclusion

Participatory skills and virtues (like team building, active listening, collaboration, and integration) must be fostered to empower more effective and just co-action on WPs. In fact, we suggest a failure to foster these skills and virtues is at the core of many current social struggles.11 The university should and could be a prime place for practicing such skills. The personal stakes and risks of working to ameliorate our collective shortcomings are likely to increase post-graduation, as students move fully out into the “real world.” When traditional coursework occurs in isolation from other courses and from students’ larger lives we forego key opportunities to integrate and test the knowledge and skills that they learn. The traditional model of education encourages an ever narrowing of focus, specialization but not integration, leaving students with dangerously incomplete perspectives and a host of unexamined assumptions.

Empowering students to take responsibility for aspects of our WPs forces us to confront the current educational paradigm. Given the nature of our shared SS challenges, educators can and should play a vital role in helping students come to terms with, and practice, failure. College, as a stepping stone from childhood into adulthood, offers one of the last relatively risk-free environments in which to learn-by-trying. Thus, we recommend pursuing pedagogies that incentivize wrestling with real-world issues without predefining the problems or routing the plan of action in advance.12

Since courses studying SS challenges are addressing WPs, they present a prime opportunity for encouraging students to “work with” others across a diverse span of interests—even when these interests...
seem to be at odds—to foster change. By integrating recommendations from the literature on WPs, experiential and community-engaged learning, and processes and methods designed to deal with our challenges (like strategic doing and design thinking), SS instructors can offer students opportunities to engage and affect real problems in the community. The strategies recommended, from mind-mapping, to ethnographic interviewing, to facilitation techniques, and seven-seven action commitments, help students develop the skills and foster the virtues necessary for collectively tackling our high-stakes public problems. These skills and virtues include—but are not limited to—epistemic humility, creative confidence, and open-minded advocacy. In the end, courses designed to respond iteratively to place-based SS challenges have the unique opportunity to foster not only the capacities necessary for tackling our large-scale social dilemmas, but also the disposition to try.

Acknowledgement

We would like to thank Sarah King for her insightful feedback on a previous draft of this article as well as all the Wicked Problem students that have come before.

References

Alpaslan, C. & Mitroff, I. 2011. Swans, Swine, and Swindlers: Coping with the Growing Threat of Mega-Crisis and Mega-Messes. Palo Alto, CA: Stanford University Press.
Bell, E., Damon, R., Eardley, D., & Siemen, J. 2013. Fresh Start: Inspiring our Youth with Knowledge, Experience, Access to Farming, Local Foods and Life Skills for Healthy and Sustainable Living. LIB322: Wicked Problems of Sustainability. http://scholar works.gvsu.edu/wickedproblems/1.
Boström, M. 2012. A missing pillar? Challenges in theorizing and practicing social sustainability—introduction to the special issue. Sustainability: Science, Practice, & Policy 8(1):3–14.
Brown, T. 2009. Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation. New York: Harper Collins.
Brown, V. & Lambert, J. 2013. Collective Learning for Transformational Change: A Guide to Collaborative Action. New York: Routledge.
Brown, V., Deane, P., Harris, J. & Russell, J. 2010. Towards a just and sustainable future. In Tackling Wicked Problems: Through the Transdisciplinary Imagination. V. Brown, J. Harris, & J. Russell (Eds.). pp. 3–15. New York: Routledge.
Burns, D. 2014. Assessing Impact in Dynamic and Complex Environments: Systemic Action Research and Participatory Systemic Inquiry. Brighton: Centre for Development Impact.
Cohen, M. 2014. When sustainability bites back: cautionary lessons from the field of public health. Sustainability: Science, Practice, & Policy 10(2):1–3.
Cook, K., Gallagher, C., Holzman, E., Neracher, J., & Miotke, E. 2015. The Grand Gleaners Project Analysis. LIB322: Wicked Problems of Sustainability Paper 17. http://scholarworks.gvsu.edu/wickedproblems/17/
Cuthill, M. 2010. Strengthening the “social” in sustainable development: developing a conceptual framework for social sustainability in a rapid urban growth region in Australia. Sustainable Development 18(6):362–373.
Dorking, S., Eisen, P., Godfrey, J., Lopez, R., & Smith S. 2015. Heartside’s Glean Ride: Bringing Fresh Food and Ideas to the Heart of Grand Rapids. LIB322: Wicked Problems of Sustainability Paper 18. http://scholar works.gvsu.edu/wickedproblems/18/
Dujon, V., Dillard, J., & Brennan, E. 2013. Social Sustainability: A Multilevel Approach to Social Inclusion. New York: Taylor & Francis.
Ferkany, M. & Whyte, K. 2011. The importance of participatory virtues in the future of environmental education. Journal of Agricultural Environmental Ethics 25(3):419–434.
Fernando, H., Sienicki, M., Dinverno, J., Warren, B., & Scholl, J. 2015. You Know, You Grow. LIB322: Wicked Problems of Sustainability Paper 19. http://scholar works.gvsu.edu/wickedproblems/19/
Fischer, F. 2000. Citizens, Experts, and the Environment: The Politics of Local Knowledge. Durham, NC: Duke University Press.
Fitzpatrick, T. 2011. Challenges for social policy. In T. Fitzpatrick (Ed.), Understanding the Environment and Social Policy. pp. 61–90. Bristol: Policy Press.
Frodeman, R. 2014. Sustainable Knowledge: A Theory of Interdisciplinarity. New York: Palgrave Macmillan.
Haapala, M., Coolman, C., & Groendyk, J. 2014. The Sprout Society. LIB322: Wicked Problems of Sustainability Paper 6. http://scholarworks.gvsu.edu/wickedproblems/6/
Hassan, Z. 2014. The Social Labs Revolution. San Francisco: Berrett-Koehler.
Hiedanpää; J., Jokinen, A., & Jokinen, P. 2012. Making sense of the social: human-nonhuman constellations and the wicked road to sustainability. Sustainability: Science, Practice, & Policy 8(1):40–49.
Jacoby, B. 2010. Service-Learning Course Design: What Faculty Need to Know. Madison, WI: Magna Publishing.
Jeavons, J. 2012. How to Grow More Vegetables and Fruits, Nuts, Berries, Grains, and Other Crops Than You Ever Thought Possible On Less Land Than You Can Imagine: A Primer on the Life-Giving Sustainable Grow Biointensive Method of Organic Horticulture 6th Ed. Berkeley, CA: Ten Speed Press.
Kelley, T. & Kelley D. 2013. *Creative Confidence: Unleashing the Creative Potential within us All*. New York: Crown Business.

Kolb, D. 2003. *Experiential Learning: Experience as the Source of Learning and Development*. Upper Saddle River, NJ: Prentice Hall.

Lake, D. 2014. Jane Addams and wicked problems: putting the pragmatic method to use. *The Pluralist* 9(3):77–94.

Lake, D. & Fauvel, A. 2015. Tackling wicked food issues: applying the wicked problems approach in higher education to promote healthy eating habits in American school children. *Food Studies* 5(1):31–42.

Lake, D., Sisson, L. & Jaskiewicz, L. 2015. Local food innovation in a world of wicked problems: the pitfalls and the potential. *The Journal of Agriculture, Food Systems, and Community Development* 5(3):13–26.

Ling, C., Hanna, K., & Dale, A. 2009. A template for integrated community sustainability planning. *Environmental Management* 44(2):228–242.

Lorek, S., Vasishth, A., & Zoysa, U. 2012. Transforming livelihoods and lifestyles for the well-being of all: a peoples’ sustainability treaty on consumption and production. *Sustainability: Science, Practice, & Policy* 8(2):1–3.

Marzano, R. & Kendall, J. 2008. *Designing and Assessing Educational Objectives: Applying the New Taxonomy*. Thousand Oaks, CA: Corwin Press.

Miller, P. 2015. Is ‘design thinking’ the new liberal arts? *The Chronical of Higher Education* March 26.

Morris, H. & Warman, G. 2015. Using Design Thinking in Higher Education. *Educause Review*. http://www.educause.edu/ero/article/using-design-thinking-higher-education.

Norton, B. 2005. *Sustainability: A Philosophy of Adaptive Ecosystem Management*. Chicago: University of Chicago Press.

O’Rourke, M. & Crowley, S. 2013. Philosophical interventions and cross-disciplinary science; the story of the toolbox project. *Synthese* 190(11):1937–1954.

Ramley, J. 2014. The changing role of higher education: learning to deal with wicked problems. *Journal of Higher Education Outreach and Engagement* 18(3):7–22.

Rittel, H. & Webber, M. 1973. Dilemmas in a general theory of planning. *Policy Sciences* 4(2):155–169.

Salwasser, H. 2004. Confronting the implications of wicked problems: changes needed in Sierra Nevada National Forest planning and problem solving. In D. Murphy & P. Stine (Eds.), *Proceedings of the Sierra Nevada Science Symposium: Science for Management and Conservation*. pp. 7–22. Albany, CA: Pacific Southwest Research Station.

Shrader-Frechette, K. 2002. *Environmental Justice: Creating Equity, Reclaiming Democracy*. New York: Oxford University Press.

Snowden, D. & Boone, M. 2007. A leader’s framework for decision making. *Harvard Business Review* 85(11):68–76.

Svanstrom, M., Lozano, G, & Rowe, D. 2008. Learning outcomes for sustainable development in higher education. *International Journal of Sustainability in Higher Education* 9(3):271–282.

Thompson, P. & Whyte, K. 2012. What happens to environmental philosophy in a wicked world? *Journal of Agriculture and Environmental Ethics* 25(4):485–498.

Turnpenny, J., Lorenzoni, I., & Jones, M. 2009. Noisy and definitely not normal: responding to wicked issues in the environment, energy and health. *Environmental Science & Policy* 12(3):347–358.

Wiek, A., Withycombe, L., & Redman, C. 2011. Key competencies in sustainability: a reference framework for academic program development. *Sustainability Science* 6(2):203–218.

Wlodkowski, R. 2008. *Enhancing Adult Motivation to Learn: A Comprehensive Guide for Teaching All Adults*. 3rd Ed. San Francisco: Jossey-Bass.

Wynne, B. 2007. Public participation in science and technology: performing and obscuring a political-conceptual category mistake. *East Asian Science, Technology and Society* 1(1):99–110.

Yin, R. 2012. *Applications of Case Study Research*. 3rd Ed. Thousand Oaks, CA: Sage.