Case Report

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Imagining just futures through interdisciplinary pedagogies: cultivating communities of practice across the sciences and humanities

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Abstract: This case study describes an experimental initiative at James Madison University funded by a National Science Foundation grant in Fall 2021 that aimed to support interdisciplinary collaborative pedagogical development related to Science, Technology, and Society (STS) with a particular focus on ethics and justice. The case study argues that creating infrastructure to cultivate and sustain small teaching communities of practice that include faculty from humanities, social sciences, and STEM fields, can support the challenging and necessary work of developing integrated STS-informed pedagogies across the curriculum. A flexible framework is examined through multiple lenses, including perspectives from each faculty participant, representing teaching departments of Biology, World Languages & Cultures, Integrated Science and Technology/Biotechnology, Justice Studies/Disability Studies, and Integrated Science and Technology/Public Interest Technology and Science. Authors provide key insights about what enables and sustains an interdisciplinary community of practice.

Keywords: interdisciplinarity; community of practice; STS pedagogies; ethics; justice

1 Introduction

This case study describes an ongoing effort at James Madison University (JMU) to support interdisciplinary collaborative pedagogical development to engage students in exploring issues of ethics and justice related to science and technology.[1] For context, JMU is a public university in a rural area of Virginia in the United States that was recently categorized as R2 within the Carnegie Classification system, indicating high research activity. Yet it is primarily an undergraduate institution, with a little over 21,000 undergraduate students in Fall 2023, an average student/faculty ratio of 17:1, an average class size of 25 students, and approximately 98 % of classes taught by professors.[2]

As part of a larger multi-institutional effort funded by a collaborative National Science Foundation grant,[3] the co-authors here came together in the Fall of 2021 to

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1 This case study builds on several collaborative presentations that the authors have done at JMU and at conferences, including "Envisioning a Just Future" presented at the 2022 annual meeting of the Society for Social Studies of Science (4 S), "Integrating Science and the Humanities in Higher Ed" at the JMU 2022 May Symposium workshop, and a JMU Center For Faculty Innovation Teaching Toolbox newsletter, "Creating Space Through Pedagogy," published April 6, 2023 in which we invited our colleagues to join us in scaling up our efforts. Here, we elaborate more on the framework that we used to forge our community of practice and reflect on what motivated each of us to do this work together and what insights we have now to better address the question of how this approach could be expanded to other educational settings.

2 These facts are posted on JMU's website: https://www.jmu.edu/about/fact-and-figures.shtml. Accessed October 4, 2024.

3 This grant is a collaboration with Colorado School of Mines, University of Maryland College Park, and Michigan State University. "Collaborative Research: RUI: Collaborative Research and Education Architecture for Transformative Engagement with STS (CREATE/STS)." JMU Grant #: 2121207. Colorado School of Mines Grant #: 2121224. Michigan State University Grant #: 2121214. University of Maryland College Park Grant #: 2121266.

participate in a series of workshops aimed at developing interactional competence between faculty in social sciences, humanities, and STEM fields by focusing on critical Science, Technology, and Society (STS) pedagogies. Interactional competence refers to having sufficient knowledge to become conversational and to engage with somebody in another field around social and ethical questions (Conley and Fisher 2019).

STS, which also stands for Science and Technology Studies, is a highly interdisciplinary field itself that broadly draws on social science and humanities approaches to examine science, technology, and knowledge production. STS pedagogies, particularly at the undergraduate level, often bring various STS concepts, frameworks, and practices to bear to engage the social, ethical, political, and legal dimensions of science and technology. These often include but are not limited to some core ideas, only a few of which are articulated here: that artifacts have politics (Winner 1986); that science is social (Fleck 1979; Kuhn 1970; Latour 1987) and not value neutral (Haraway 1988; Harding 1993); that technological development is highly contingent (Latour and Woolgar 1986; Pinch and Bijker 2012; Wyatt 2008); and that to study sociotechnical systems requires attention to power dynamics and both material and discursive dimensions (Barad 2007; Haraway 1989).[4] STS pedagogies can be found not only within STS programs but often in engineering, design, computer science, sociology, history, anthropology, geography, communication, and other disciplinary and curricular settings.[5] Within STEM education contexts, STS-informed pedagogies often support learning objectives related to critical thinking, human-centered design, stakeholder engagement, communication, public interest technology, and ethics.

The grant was designed to support the iterative development and evaluation of a framework for using STS pedagogies to forge new communities of practice across the humanities and sciences. Here, we focus on specific practices and results of the JMU implementation. By 'community of practice' we are drawing on Lave and Wenger's attention to the relationship between community and knowledge, and particularly their argument that a community of practice involves more than technical knowledge and skill, constituting "a set of relations among persons, activity, and world, over time and in relation with other tangential and overlapping communities of practice" (Lave and Wenger 1991, p. 98). Indeed, the co-authors of this case study, all part of the JMU implementation, came to understand themselves as an interdisciplinary community of practice that is well-positioned to continue developing ethically engaged STS-inflected pedagogies across the curriculum. How did this occur and why does it matter?

Following a brief rationale for supporting interdisciplinary, collaborative pedagogical development and the details of the workshop implementation, faculty participants share individual vignettes through which readers will learn: 1) What motivated them to participate? 2) How did they come to recognize and value the collaborative group as a community of practice? 3) What did this community of practice afford for their pedagogical development and professional and personal growth? 4) What are their key insights with respect to cultivating such communities?

The authors will conclude with a discussion of the opportunities and challenges of cultivating such interdisciplinary collaboration and pedagogy at JMU, with an eye toward providing situated but relevant takeaways for establishing such programs in other institutional contexts.

2 Rationale

Students need basic understanding and core competencies related to science and technology, and particularly related questions of ethics and justice, regardless of their majors. While general education programs typically aim to introduce students to concepts and methods in the humanities, social sciences, and natural sciences, these are often taught quite separately by faculty who have expertise in their particular fields. Yet students need exposure to thinking holistically across these disciplinary frames in order to practice engaged citizenship in a democracy and address complex 21st century problems (Stoller 2020).

Collaborative teaching provides one avenue for integrating expertise across disciplines to support interdisciplinary pedagogies. Yet it is notoriously challenging to achieve effective and sustainable interdisciplinary collaborative teaching arrangements at both a personal level (Di Giulio and Defila 2017) and in relation to institutional structures that struggle to accommodate faculty teaching outside their departments or to provide full teaching credit for a co-taught class (Holley 2019).

4 "STS Postures" is a framework developed by David Tomblin and Nicole Mogul that captures these elements and more (2020), and undergraduate resources like the *Technology and Society* reader by Deborah Johnson and Wetmore (2021) are good introductory resources for further exploring STS in relation to pedagogy. A broader exploration of STS and STS pedagogies is outside the scope of this case study, and the list and citations provided here are quite limited.

5 For a broader engagement with STS pedagogies, see a forthcoming special collection in *Engaging Science, Technology, and Society* and particularly the introduction (York and Okune 2024) and large collaborative manuscript that emerged from a 2021 "STS as a Critical Pedagogy Workshop" (Conley et al. 2024).

What if faculty could learn from each other, collaboratively develop mutually informed pedagogies, and form a community of practice to support ongoing work toward more integrated pedagogies that engage the social and ethical dimensions of science and technology? We suggest that creating the infrastructure to support cultivating small teaching communities of practice that span STEM, humanities, and social science fields can partially address the needs outlined here. Such a community of practice can then collaboratively work to create interdisciplinary pedagogies, resulting in integrated curricula implemented both "within and across disciplines" (Cheek 2021, p. 14), and the reconfiguration of "the educational space as a site for pluralist/transdisciplinary dialogue" (Burnard et al. 2022, p. 168). In the classroom, each member of this community of practice is teaching by herself. But she enters the classroom informed and supported by the community, with new resources, insights, methods, materials, and grounding in a diverse set of perspectives.

3 Implementation

This framework for developing an interdisciplinary community of practice has four key elements: 1) There is a shared ethics- or justice-related theme that draws faculty together from fields that span various STEM disciplines as well as those in the humanities and/or social sciences; 2) Undergraduate students participate as collaborators; 3) STS theories, practices, and pedagogies serve to bridge and orient faculty toward each other; 4) There is a focus on developing new pedagogies informed by STS and by the collective participants' disciplinary and teaching expertise, with no one field set up to merely serve the needs of the other.[6]

Our shared theme was "Imagining Just Futures in Relation to Science, Technology, and Society." The Co-PIs of the grant who are trained in STS – York and Conley – issued a call for four faculty to participate. In selecting participants they ensured that at least two taught in science or engineering fields and two in humanities or social science fields, that participants had identified a spring course they were scheduled to teach in which they would be willing to integrate new material related to the theme, and that they committed to attending the workshops. Within those constraints, York and Conley prioritized identifying a group whose spring teaching plans suggested potential for a vibrant exchange of ideas.

The resulting faculty cohort (co-authors of this paper) represented departments of Biology, Justice Studies, World Languages and Cultures, and the School of Integrated Sciences. The courses they were teaching included, respectively, a General Education course on Contemporary Topics in Biology; an upper level course on Disability and Justice; a General Education literature course on the topic of Humans, Animals, and Machines; and an interdisciplinary course on Global Infectious Diseases. Each faculty member was able to recruit an undergraduate student as well, for a total of nine students who were paid as research assistants. York and Conley trained the students to co-facilitate four 2.5-h hybrid workshops with faculty that were designed to cultivate interactional competence and introduce STS pedagogies. Two final hybrid meetings with faculty provided an opportunity to workshop new course module designs with each other.

The first two workshops used Juicy Words and a modified Sociotechnical Integration Research (STIR) protocol to identify points of connection between faculty courses. Juicy Words is a pedagogical technique developed by Conley that asks students to identify words, phrases, and/or passages in a text that elicit a personal response. The aim is to facilitate students' attention to text and to spark their own intellectual curiosity. 'Juicy' is purposefully humorous and abstract; it suggests that there isn't a right or wrong answer and the reader should attend to their own feelings, whether they be surprise, interest, anger, etc. In the workshops, students identified words and phrases from the faculty members' syllabi and selected readings to invite broader discussion and elaboration of different disciplinary jargon and perspectives. STIR is a protocol designed to support "midstream modulation," a method through which social scientists facilitate reflexive engagement with values and ethics in everyday decision-making that occurs in STEM practices (Fisher et al. 2015). Adapted for this workshop by Conley and York, students identified *opportunities* for topics that might arise at the intersection of each course and that could potentially be suitable for a new module; led conversations then about *alternative* ideas for modules; facilitated discussion about *considerations* to explore concerning these different ideas; and finally guided faculty toward a tentative *decision* about a topic to continue exploring together.

In the second and third workshops, students led faculty in doing Creative Anticipatory Ethical Reasoning (CAER) to collaboratively imagine just futures in relation to the selected topics of genetic editing and robotics, with each topic approached from both social and technical perspectives. CAER is a pedagogical approach developed by York and Conley that draws on scenario analysis, design fiction, and ethical reasoning frameworks to support hands-on and

6 See Reddy et al. 2023 for a description of this grant implementation focused on a second iteration at Colorado School of Mines.

robust engagement with STS concepts and practices (York and Conley 2020). In the fourth workshop, students developed and presented key STS concepts (or concepts taken up in STS) to the participating faculty. Working with York and Conley, the students selected the particular concepts as ones that both resonated with themselves and that they thought would be particularly relevant to the faculty in their teaching. These included technoableism (Shew 2020), standpoint theory (Harding 1993), and design justice (Costanza-Chock 2020), among others.

In the spring semester, faculty integrated their new pedagogies into their spring classes. In most cases, one or more other faculty participants and student research assistants were able to observe the implementation. Finally, we collectively reflected on the experiences of the workshops and the pedagogical outcomes.

4 Faculty perspectives

4.1 Disability studies and justice studies: Daisy Breneman

When I learned about this opportunity, part of my excitement was around engaging in interdisciplinary exploration, particularly across the sciences and the humanities. Being from the interdisciplinary and emerging fields of Disability Studies and Justice Studies, I already understood the power of interdisciplinarity to rethink, rediscover, and transform, in this case the way I engaged with my Disability and Justice course.

But another compelling factor was the people. I was on vacation (with a stern away message on my email, that I was only semi-ignoring), but when I noticed the call to participate from Emily York and Shannon Conley, I couldn't resist. From previous collaborations, I admired the generative, collaborative spaces they create on campus and beyond, and I very much wanted to work with them.

What I couldn't anticipate was the caring community we would all go on to create. Yes, the work mattered and was central to our connection, but we also learned to listen, to challenge and be challenged in caring, not adversarial, ways. We learned from each other. We could hold various perspectives at once. We could support each other through challenging personal and professional times. We could be authentic with each other.

The course deeply benefited from the infusion of STS practices, theories, readings, and approaches. Technoableism (Shew 2020), the ethics of genetic engineering, inequities in access to vaccines, the potential future of robotics and artificial life–all of these have been infused in my course and have opened up exciting teaching and learning opportunities in my classroom. But more than that, I gained invaluable lessons on intellectual humility, perspective taking, creating caring communities of practice, and the value of sustained connection. The synergy of what we created was part of the magic, re-igniting a passion for learning and teaching at a time of devastating faculty *and* student burnout (McClure 2021).

Some of the key elements of that magic included intentional and thoughtful design, reflexive practices (Downey and Zuiderent-Jerak 2017) and centering justice at the heart of the process, content, and ways of being with each other. Prioritizing relationships and care made the experience truly transformational.

4.2 World languages and literature: Holly Yanacek

Two things that I enjoy most about academia include opportunities for interdisciplinary work and close collaborations with colleagues. This NSF-funded project offered both. During the initial participant interview for this project, I answered a question about interdisciplinarity and shared my assumption that radical interdisciplinarity leads to high-impact, accessible teaching and scholarship. My work in literary and cultural studies tends to be interdisciplinary anyway – it focuses on emotion studies, care ethics, gender studies, human/machine interaction, animal studies, and posthumanism. However, before I participated in this project, I had never engaged in radically interdisciplinary curriculum development in collaboration with colleagues in STS or STEM fields. I was eager to do so and to learn from colleagues also committed to pedagogical initiatives that center diversity, equity, inclusion, justice, and accessibility.

With the support of this community of practice, I integrated new pedagogical approaches from STS into a General Education literature course I taught at JMU in Spring 2022 on the topic of Humans, Animals, and Machines. The new course module I created for this project asked students to work together to imagine what might characterize a just future in a society impacted by advances in both gene editing technologies and social robotics. My students considered how these developments could transform ways of life in the years to come and discussed how different stakeholders would be affected. After completing the CAER process, students worked in groups to create design fictions that represented their imagined future scenario. We then

compared their own imagined futures with those imagined in the literary works studied in the course. My students reported that this course module featuring STS pedagogies deepened their critical thinking and helped them understand what literature has to offer in discussions of ethics, justice, science, and technology.

Since Spring 2022, I have refined the module I developed for the General Education literature course and integrated STS pedagogies and other content and methodologies that I have learned from this community of practice into other courses. I am grateful that we have found time to meet and plan new collaborations in spite of our busy schedules and the highway that separates most humanities and STEM departments on JMU's campus.

When done well, interdisciplinary work can push the boundaries of what we know and lead to creativity, playful experimentation, and innovation. Scholarly collaborations, although they have long been common in STEM fields, remain less common in the humanities, where single-author publications are often the expectation and norm. Yet collaboration with colleagues, especially across disciplinary boundaries, allows a team to achieve much more than any one person could do on their own. This is what I experienced myself as a result of participating in this project.

4.3 Biology: Christine May

In my experience as a biologist, students are enthusiastic and motivated for deep learning about genetic engineering, a biotechnology that is rapidly advancing and changing the way we think about and interact with the fundamental blueprint of life itself. Teaching 'alone' about the scientific aspects of genetic engineering felt too disconnected from the reality that the upcoming generation will be facing as this biotechnology provides great opportunity but also substantive risk. This motivated me to seek out opportunities for interdisciplinary collaboration and learn the perspectives of others within the framework of ethics and justice.

The value of becoming a member of the community of practice and engaging with STS pedagogy was immediately evident. Through this interdisciplinary team I came to embody their diverse perspectives, and I find that I take a small piece of each of them with me into the classroom. Given that traditional team teaching is difficult to facilitate and often does not have institutional support, this community provided a new model for embodying the spirit of a team but through teaching independently (yet supported and enlightened).

Through this collaboration I achieved great personal and professional growth, and my students have benefitted from diverse and ethical perspectives on a technology that will undoubtedly shape their future. Key insights for cultivating such communities include: 1) building a community based upon shared themes, 2) inherent interdisciplinarity within the team, 3) committing to time together to build a genuine sense of community and mutual respect to learn from each other's expertise, and 4) joyful collaboration that inspired us and did not feel like an extra meeting or task but uplifted and motivated each of us to learn together and innovate.

4.4 Integrated science and technology, biotechnology: Cindy Klevickis

As an educator with over 40 years of teaching experience, I have always believed that complex global challenges, such as poverty, hunger, and infectious diseases, require interdisciplinary solutions. These challenges are not solely technical; they are social and ethical as well. While I feel confident teaching the scientific and technological aspects of these topics, I recognize that I lack formal training in the humanities. Participating in this program allowed me to collaborate across disciplinary boundaries, merging scientific approaches with critical thinking and ethical frameworks from the humanities. This opportunity was particularly appealing given my experience teaching "Breaking the Cycle of Poverty, Hunger, and Infectious Diseases," a course in which students from all majors come together to explore complex socio-technical problems through interdisciplinary lenses.

Almost immediately, It became clear that the group wasn't just a collection of individuals working together on developing class modules, but a community committed to creating a more just world. In this shared space, knowledge, experiences, and methodologies from various fields were exchanged and co-created. We weren't simply sharing content; we were actively reflecting on how our disciplines could collectively contribute to addressing global inequalities. This sense of purpose, grounded in a shared commitment to justice, made the collaboration especially meaningful. The community became a space for reflective learning, where I could explore new ways of thinking and apply them in my pedagogical practice. Input from other members, particularly regarding the social and ethical analysis of scientific topics, gave me the confidence

to incorporate these dimensions into my classes. This not only enriched the student experience but also made my teaching more personally fulfilling, as I felt I was contributing more intentionally to a larger goal of fostering social equity through education.

Cultivating a community of practice involves not just engaging in shared work but also reflecting on the process itself – understanding how our disciplines influence our worldviews and the ways we contribute to knowledge production. I think that the entire group would agree that this reflective aspect is crucial for fostering deep, transformative collaboration.

4.5 Integrated science and technology, public interest technology and science: Emily York

This project grew out of work that we (York and Conley) were doing in the STS Futures Lab, a space we had created to integrate research and pedagogy related to STS, ethics and justice, and responsible innovation (Conley et al. 2022; York and Conley 2019; York et al. 2019). With inspiration from scholars who engage with scenario analysis and design fiction for critical futures work like Cynthia Selin (2011) and Julian Bleecker (2009), we created the CAER process specifically to engage STEM students in applying ethical reasoning and STS concepts in a creative way that could cultivate critical thinking and moral imagination (York and Conley 2020). We also began to use CAER as a facilitation technique in the context of a project we called "Co-Imagining Futures," in which we invited faculty experts to join us and our undergraduate students in the Lab to participate in a student-facilitated CAER process about the expert's chosen topic. This alerted us to the rich possibilities for involving students not just as learners but as collaborators in co-facilitating workshops with faculty from different disciplines. Specifically, we noted that student participation helped participants to engage in mutual teaching and learning, cultivate disciplinary humility, and communicate without disciplinary jargon (or attend to jargon as something to be explained).

In implementing this grant at JMU it was important for us to be transparent and to invite faculty participants to be partners and collaborators, not just part of a research study. To that end, we met with each individually at the outset to communicate the goals and ethos of the project and to solicit their input. This immediately resulted in a change to the design of the workshops. For example, we had anticipated holding two half-day in-person workshops over the semester. However, Daisy Breneman alerted us to the challenges from a Disability Studies perspective of requiring in-person workshops particularly in Fall of 2021 during the Covid-19 pandemic. We recognized that if we wanted to be inclusive and really partner with the faculty on this project, we needed to take that feedback seriously and adjust. We changed our workshops to a hybrid modality.

However, we also recognized that asking people to participate on Zoom for a half day was untenable. This led to the expansion into four 2.5 h hybrid workshops, not including the pedagogy design workshops at the end of the semester. We also held a separate meet-and-greet hybrid meeting at the beginning so that we could all say hello and learn what excited us in our teaching and why we were participating. While a hybrid modality presents challenges, we found that having this extended set of workshops created a temporal rhythm and space that allowed us to build relationships, to reflect on what we were learning and articulate questions, and to gain the confidence we needed to explore not just points of connection but also points of dissonance and challenge as we moved outside our comfort zones.

Even as this occurred, I didn't fully recognize that we had become a community of practice until at least the Spring 2022 semester. I began to sense this first when participating faculty implemented their new pedagogies and modules in their spring classes and we had a chance to reflect on how they incorporated a variety of different perspectives and methods. I had not anticipated that they would feel comfortable implementing CAER as an STS pedagogy in their own classes, but Holly Yanacek tried it, adapting a gamified version of the process that we had developed. I think this validated that it was both feasible and effective, and subsequently Christine May and Cindy Klevickis also tried it in their classes.

I began to recognize that there was a genuine multi-directional flow of learning that had taken place, not just with faculty adopting CAER as a pedagogical approach, but also in the ways that they engaged with each other's expertise. For example, I saw that ideas about disability justice were getting taken up across the faculty. Additionally, when we began to present together and share what we were doing with colleagues at JMU and at external conferences, I began to recognize that we were a 'we', that together we valued what had happened and wanted to find ways to share it with others. And finally, as we have continued our collaboration, I see how different members are taking leadership in this work, for example, Christine May developing a lightning talk to share this work at an American Association of Colleges and Universities (AAC&U) meeting,

or Daisy Breneman leading the development of a faculty community of interest through our Center for Faculty Innovation at JMU.

To the insights shared above about cultivating a community of practice, I would add the following: 1) Collaborate with a colleague to plan and organize the initiative, if possible; 2) Leverage institutional resources that might exist for faculty professional development to provide some stipends; 3) Try to involve some undergraduate students by leveraging funds to support them as research assistants or by incorporating an independent study or a small class; 4) Be willing to modify and adapt to be responsive to the needs, interests, and creativity of the group.

4.6 Integrated science and technology, public interest technology and science: Shannon N. Conley

In reflecting back, it becomes clear to me how crucial Daisy Breneman's suggestion that we move to a hybrid approach would be in creating an inclusive environment for all of us. I live with invisible disabilities, and throughout the course of this collaboration, I also grappled with new diagnoses that made everything feel even more uncertain.

The flexibility of the shorter, hybrid sessions was a game-changer for me, as it allowed me to stay fully involved, co-lead, and contribute to this project while attending to my health. Having the freedom to join from home when I wasn't feeling well, or to pace myself through the process, meant I could show up as my authentic self without feeling pressured to push beyond my limits.

This wasn't just about accessibility in a logistical or conceptually academic sense – it was about the ethos of how we worked together, and I felt that my needs were truly valued and respected. I felt incredibly supported by this group, and that sense of care extended beyond the work itself. It helped me navigate the exhaustion and uncertainty that came with my health challenges, and reminded me that collaboration rooted in empathy and flexibility can be genuinely transformational.

This experience has been a salient reminder that accessibility isn't just a checkbox or a "nice-to-have" – it's a foundational element that shapes the quality and depth of our work. By centering anti-ableist practices and truly accommodating each other's realities, we didn't just create better teaching tools or modules, but a supportive and caring community that allowed each of us to thrive. And that, to me, is the essence of imagining just futures – not only in the content we teach but in the ways we choose to engage with one another.

5 Discussion

The complex opportunities and challenges that our graduating students will encounter increasingly require holistic and integrated perspectives that cut across knowledges and methods in the social sciences, humanities, and STEM fields. Yet, to support such pedagogies across the curriculum, institutions of higher education need to provide the infrastructure for faculty to work together in a meaningful and sustained way. Our experience at JMU notwithstanding, the observation that "while interdisciplinarity in principle is accepted, in everyday practices on campus it is the disciplines that count" (Sørensen and Traweek 2022, 180) still resonates.

What we are proposing here builds on but exceeds one-to-many faculty professional development opportunities, where faculty might attend a workshop to learn a technique or tool. Here, the STS faculty who convened the workshops provided one kind of expertise related to STS pedagogies and STS methods for building interdisciplinarity. But each of the other participants also contributed knowledge and expertise that were essential to the cultivation of a community of practice that could support truly interdisciplinary pedagogies that were accessible and appropriate for very different courses. Moreover, the knowledge and expertise that each brought was not merely transferred from one to the other. Rather, through our extended engagement we had the opportunity to teach and learn together, challenging each other's and our own disciplinary dogmas.

This included learning from the undergraduate student participants, whose co-facilitation helped faculty to explore new concepts and practices in ways that were not steeped in jargon. Students also contributed their insights and affective responses to STS concepts and to various approaches to teaching and learning.[7]

To highlight several insights shared above, doing this work effectively required a shared 'matter of concern' articulated here as the theme; participants' interest in and commitment to interdisciplinarity; collaborative space and time coupled with thoughtful design and reflexive practices to cultivate caring relationships that were in turn necessary to build trust; and a design that worked with the regular challenges of scheduling and workloads to ensure that faculty could participate without it being just one more burden or obligation.

7 The Co-PIs of the NSF grant from all four institutions are currently collaborating on a publication that focuses on how students contribute to collaborative pedagogical design.

While this case reveals the power of individual investment in collaboration, there is also a need for increased institutional investment, systemic changes, and infrastructure that supports interdisciplinary collaborations. At many institutions, competition for resources fuels territoriality that challenges connection. Sørensen and Traweek note that "at most universities interdisciplinarity work cannot rely on the stable institutional infrastructure that would support those engagements" and that "confining interdisciplinarity to discretionary resource allocation severely undermines it" (2022, 181). Creating structures that are supported by the institution, potentially through centers for teaching and learning, would help ensure that such opportunities become part of the culture–not just exceptions that happen in extraordinary circumstances.

Indeed, as our grant ends, our own ongoing efforts are constrained by working within the norms of heavy teaching and service loads and disciplinary and departmental siloing. We are currently exploring a layered approach that involves leveraging resources from our Center for Faculty Innovation to support regular meetings of a faculty interest group; developing a course structure hosted through the STS Futures Lab to support student involvement in facilitating workshops with members of the faculty interest group through which students would learn skills in STS, group facilitation, qualitative methods, and communication; and a proposal to create an instance of an existing upper-level general education course focused on critical thinking that a community of practice like ours could co-develop and then rotate through as individual instructors.

This case study outlines a framework and rationale for developing interdisciplinary communities of practice across the sciences and humanities to support integrated STS-inflected pedagogies related to ethics and justice. Such pedagogies can be informed by the community, but taken up and implemented in discipline-appropriate ways for different STEM, social science, and humanities classes. The framework necessarily needs to be adapted to each institutional setting, with specifics depending on faculty interest in pedagogy and the shared theme; participants' areas of expertise, including the knowledges and skills of whomever is inspired to organize and facilitate the initiative (who may or may not identify with STS specifically); the institution's existing dynamics with respect to siloing, interdisciplinarity, and teaching loads; and individual capacities with respect to time and labor.

For us, this work is difficult and takes time and care, and it is also deeply rewarding. We value the opportunity to be in collaboration and to have thought partners across the institution as we imagine just futures with each other and with our students.

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