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Students as Change Agents for Community–University Sustainability Transition Partnerships

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Abstract: While higher education institutions play a role in regional sustainability transitions, community–university partnerships for sustainability may be underdeveloped and fraught. Moreover, the specific role of students in building and strengthening those partnerships remains little explored. This research occurred in Laramie, Wyoming—the first community to resolve to pursue carbon neutrality in the top coal-producing state in the U.S.—amidst declining state revenue and absent any formal community–university sustainability partnership. Drawing on a community resilience framework and the social-theoretical construct of agency, we examined an informal, multi-year partnership developed through a project-based, community-engaged Campus Sustainability course at the University of Wyoming. Through a chronological sequence case study, we synthesized autoethnography, document analysis, and semi-structured interview methods involving community and university stakeholder and student participants. We found that students, rather than other university actors, played a vital bridging role in absence of a formal community–university sustainability partnership. They also served in a catalyzing role as change agents alongside community stakeholders, providing the potential to develop stronger community–university partnerships and advance sustainability transitions across other Wyoming communities. Findings suggest a need to keenly attend to power dynamics and *whose* agency is driving higher education institutions' roles in regional sustainability transitions in specific contexts.

Keywords: students; agency; community resilience; sustainability; higher education institutions; community–university partnerships; climate action planning



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1. Introduction

Natural resource-dependent communities in the Mountain West region of the United States (U.S.) are increasingly vulnerable to the effects of the global climate crisis. These communities are experiencing, for example, increased drought and wildfire and interrelated impacts to their resource-based economies. Further compounding these problems, small and rural communities often lack the financial resources and economic diversity to effectively plan for and adapt to the impacts of climate change [1,2]. In the western U.S. state of Wyoming, which is the top national producer of coal and a major producer of other fossil fuel resources, the recent economic crisis and downturn of these resources has amplified economic challenges. In response to those challenges, individual Wyoming communities are beginning to pursue greenhouse gas emissions reduction and carbon neutrality efforts. These efforts aim not only to mitigate climate change but also to pursue energy efficiency, save money, and reduce reliance on diminishing state revenue [3].

Joining an ever-growing number of communities in the U.S., in 2020, the City of Laramie became the first Wyoming municipality to formally resolve to pursue carbon neutrality. Laramie is home to the singular four-year, flagship, and land-grant university in the state, the University of Wyoming [4]. Early in the carbon neutrality commitment and

subsequent climate action planning process, municipal employees and local community organization members sought support from the University. The largely informal partnership primarily occurred through a campus and community-engaged sustainability course and student engagement. This partnership provides the focus of the present research. Broadly, this kind of partnership is exemplative of calls for higher education institutions (HEIs) to synthesize research, teaching, operations, and community engagement to support transformative change for a more sustainable future. (We use the terms ‘higher education institution’ and ‘university’ largely interchangeably. As our research context is a U.S. land-grant university, we often use the term ‘university’. However, we acknowledge the range of non-university higher education institutions that engage in sustainability action, regional transition work, and community partnerships.) In particular, university curricula should “improve local and regional communities so that they are healthier, more socially vibrant and stable, economically secure, and environmentally sustainable” [5] (p. 18).

The civic role of the university is at the heart of calls for HEIs to support transitions toward a sustainable future. The improvement of society and quality of life is one motivation driving this “third mission” for HEIs to engage in their surrounding communities [6]. As multi-level institutions, universities comprise myriad individuals working in numerous networked spheres of influence for sustainability, including transdisciplinary engagement [7]. This engagement, coupled with universities’ resources and mission for research and teaching, can help spur highly contextualized regional transitions towards sustainability [8]. As HEIs lead toward these transitions and goals [9,10], community–university collaboration can also strengthen links between research, teaching, and community service [11]. Not only can direct engagement with community partners and stakeholders fulfill tangible university research and learning objectives, it can also strengthen social and civic capital [6] and stakeholder trust building to actively build regional networks [8]. Strengthened capital and trust can increase community organizations’ desire for partnerships with HEIs and aid HEIs in negotiating their role as sustainability change agents [12].

Despite the potential role of HEIs in sustainability transitions, specific community–university partnerships are often underdeveloped and fraught. Tension emerges from structures and practices that minimize community authority and knowledge [13] and distrust borne out of the university as an academic industrial complex that preserves status quos [14]. The “town–gown relationship” has received historic critique for the impacts of an increasing student population on the community, inequitable university demands on local resources and services, unbridled campus expansion and construction, and overall lack of community voice in decisions surrounding these activities. Town–gown issues may similarly emerge in university sustainability activities that exclude the community from corresponding decisions and benefits, as a study exploring Cornell University’s carbon neutrality efforts indicates [15]. University sustainability efforts and professionals can employ public engagement and environmental community relations strategies to improve public trust and strengthen town–gown relationships. However, university-imposed sustainability challenges can be the source of such strained relationships in the first place. For example, the University of Connecticut’s campus growth and contamination from the school’s landfill historically spurred community resentment and mistrust [16]. In our own context, recent legislation has proposed that the University of Wyoming may shift to its own well water supply independent of the City of Laramie’s public water and sewer system. This proposal has heightened community tensions over potential economic and environmental impacts [17].

In the midst of such underdeveloped or potentially even fraught relationships between the community and university around sustainability, our research question is: what role do university students play in building and strengthening community partnerships to support regional sustainability transitions? In this paper, we investigate the case of a multi-year informal community–university partnership through a project-based and community-engaged sustainability course at the University of Wyoming. By synthesizing multiple qualitative methods to create a rich case study, this research documents the specific

support provided by students in Laramie's local climate action commitment and planning efforts. It also investigates how these efforts rapidly emerged in a political and economic context that poses challenges to regional sustainability transitions. Through this case, we explore whether and how students can uniquely serve as effective change agents in local sustainability processes.

2. Conceptual Background

We apply a community resilience framework to this research for three main reasons. First, universities exist within their greater social-ecological community contexts, particularly U.S. land-grant universities such as the one that provides our focus. Due to their three-pronged missions of research, teaching, and extension, land-grant institutions have long pursued the transdisciplinary engagement with community stakeholders required in response to global and localized social-environmental challenges [18]. Second, previous research has linked community resilience with sustainability, particularly in its social aspects [19]. Finally, these frameworks highlight the central role of agency in developing resilience, which is a relevant social theory construct for our focus on HEIs and students as change agents. Accordingly, we begin this conceptual background by introducing community resilience frameworks and the role of agency within them, including a brief connection to theoretically robust social and anthropological perspectives on agency. Then, we shift to a review of student-led action and learning for sustainability in higher education and the greater communities in which HEIs are embedded. Finally, we close with a brief discussion of literature focused on the broader role of HEIs as regional change agents (i.e., not students as change agents *per se*) through research and teaching, including potential barriers to partnerships for sustainability transitions.

2.1. Community Resilience and Agency

Integrating social-ecological systems, public health, and community development perspectives, community resilience refers to the ability of a community to mobilize its resources and strengths in response to social and ecological change and uncertainty [19,20]. Community characteristics, including local knowledge, skills, and learning; diverse and innovative economy; engaged governance; community infrastructure; and social networks enable community resilience [20]. Within community resilience models, agency is both a key mechanism and an emergent property of those combined community characteristics [19–21]. These models define agency as “taking planned action to effect change” (i.e., not simply the potential to act but the actuality of community-level action) [19] (p. 404).

Vaneekhaute and coauthors [21] introduce Archer's [22] morphogenic theory of agency to community resilience perspectives, suggesting individuals act within, are conditioned by, and additionally influence social and cultural structures. This theorization echoes similar anthropological and social theories of agency that account for both acting humans and the institutional, cultural, social, and historical processes that both enable and constrain people's ability to act within the world [23–25]. In this way, agency is the “socioculturally mediated capacity to act” [26] (p. 112). While communities must move beyond capacity and actually act in resilience frameworks, the social nature of agency better illuminates its role in communities wherein individuals must relate to each other and act within complex power dynamics [20,25]. These power dynamics become particularly relevant in our discussion below of the frequently inequitable relationship between HEIs and communities.

While increasingly theorized in the community resilience literature, empirical studies of how agency occurs in specific contexts to support community resilience are lacking [21]. One study of farmers' adaptations to environmental change suggests that reflecting on their practices and sharing them with others may enable collective agency for resilience [27]. Another study of a community–university participatory research partnership for health, gardens, and food systems in Wyoming explored how ‘sociality’—the unique relational processes whereby otherwise loosely connected individuals come together—cultivates

agency for community resilience [28]. Accordingly, we further explore the literature on students' action and agency to better understand one relational aspect of the potential role HEIs can play in community resilience and regional sustainability transitions.

2.2. Student Learning and Action for Sustainability

Most research on student action for sustainability has focused on student learning outcomes and change agency *within* HEIs. Frisk and Larson [29] identify action orientation and change agent skills as one of four key competencies for sustainability education. Students develop these skills through project-based and community-engaged pedagogies, wherein they critically engage with society and transform their own sustainability literacy and learning outcomes [30]. Sustainability project-based learning contributes to student employability, professional development, social responsibility, and an enhanced learning experience [31,32]. Such learning approaches may engage stakeholders, such as community groups, and allow students to adopt an action orientation for real-world change [31]. One recommendation for enabling change agents for HEI sustainability explicitly advocates a broad shift toward transformative pedagogies, such as community service, problem-based, and experiential learning [33].

Notably, much of the above research emphasizes student outcomes as opposed to examining the process of action itself and subsequent societal or community outcomes. However, bottom-up, student-driven sustainability action can promote change within universities [34]. A review of student-led sustainability action indicates students often maneuver outside traditional administrative and governance structures in HEIs. Key areas of action include policy, behavioral change, and education, while conservation efforts to some extent focus on the connection between students and the broader social-environmental community [33]. Outside of the classroom, extracurricular organizations allow students both to engage in collective action and bridge project-based, curricular learning to influence sustainable change on their campuses [30,33]. However, even through internal action within universities, students often experience barriers due to the relatively little power they hold compared to other university actors [33]. Additionally, Evans [35] offers a robust theoretical perspective for "sustainability-oriented agency", wherein students engage and reflect through action-based pedagogies. Building from concepts of praxis, this agency amounts to value and theory-informed purposeful action upon the world. Empirical research findings indicate that students in the Colorado Mountain College Sustainability Studies program conceptualized agency as key for both their own personal and greater community resilience.

2.3. HEIs as Regional Sustainability Change Agents and Power Imbalances

The general role of student action and its specific contribution to the role of HEIs in regional and community transitions has received relatively little attention within the higher education sustainability literature [33]. Universities writ large, however, may serve as change agents for regional sustainable development when exceeding typical, top-down knowledge dissemination and generation for more transformative ends. Such transformation can occur through educational programs that engage local stakeholders in jointly identifying and determining learning outcomes based in community-based need and priorities [36]. In their research on HEIs' role in regional sustainability transitions, Hoinle, Roose, and Shekhar [37] examine two transdisciplinary certificate programs that engage non-governmental, governmental, and private regional stakeholders. Within a multi-level perspective, the authors frame these programs as a niche practice occurring in an innovative space affording seed planting for growing more transformative regional change.

Universities may also engage in co-research, a joint process between academics and community partners analogous to action and community-based participatory research approaches [36,38,39]. One such research project explored food justice work through partnerships between community-based organizations and universities across the United States, including in Wyoming. Graduate students engaged in this research found that while

they represented academic partners and enjoyed many of the same powers and privileges academic positions afford, they existed in a space “in between” community and academic partners. That space helped them to bridge divides between universities and communities as a result of “academic supremacy” [40]. Building from our introductory discussion of strained town–gown relationships, academic supremacy occurs through systemic power imbalances that favor university actors over community actors. Inequities materially manifest through employment conditions, institutional support, capacity development, and authority over budget allocation, spending, and other decisions [13].

A similar equity gap occurred in collaborations in the aforementioned transdisciplinary sustainability teaching programs. Community stakeholders often participated voluntarily in comparison with academic faculty whose commitments are accounted for within job descriptions. Additionally, sharing outcomes and knowledge generated from program activities with regional partners proved challenging. However, teachers can help build confidence and empathy with community partners by advocating for alternative publications and personally engaging in local sustainability efforts. This kind of relationship-building may be particularly useful when university–regional partnerships have been unsuccessfully forced in the past. Findings indicate that programs may have little direct impact for regional sustainability. However, both teachers and partners demonstrated motivation to engage as change agents, and programs indirectly raised awareness and strengthened networks for regional sustainability [37].

This review weaves together theoretical perspectives on community resilience and agency with literature on student sustainability action, which typically focuses on their learning and engagement within HEIs. We also expand on our brief introduction to include literature related to community–university partnerships, which has tended to focus on research partnerships and the roles of teachers and community partners. Our review uncovers a gap in the literature on *students’* particular forms of agency in community–university sustainability partnerships. Additionally, it prompts attuning to power dynamics in these partnerships and in examinations of social-theoretical concepts of agency. The need for greater attention to both student agency and power dynamics informs this case study.

3. Methodology

As the context, data, and phenomena of interest in this research are highly interrelated, we adopt a case study approach informed by multiple qualitative methods and data sources. This convergence of methods and evidence informs a rich single-case study that extends across several years [41]. We begin by describing the context of this study based in the University of Wyoming Haub School of Environment and Natural Resources “Campus Sustainability” course and our positionality within this research.

3.1. Context and Positionality

The University of Wyoming has a long history of student engagement through sustainability curricula. Specifically, Campus Sustainability course students engage in applied, semester-long projects to enhance sustainability. Previous scholarship on this course emphasizes the University’s goal to “create good citizens of the nation-state” through sustainability education. That scholarship, however, primarily emphasized earlier course projects that focus inward on enhancing sustainability within the University itself as the means for that kind of civic engagement [42] (p. 118). Grounded in project-based and community-engaged learning approaches [43–45], the course engages students with real-world, complex, team-based projects that result in concrete products or outcomes for campus and community sustainability professionals who serve as mentor-partners. Projects focus on the specific challenges and needs of relevance to and identified by these partners to achieve more equitable, co-identified outcomes.

The course syllabus includes an explicit commitment to campus and community mentors for the semester-long sustainability projects. This mentor connection aims to enhance student experiential learning and project-based activities through engagement; strengthen

partnerships between the sustainability curriculum and the campus/greater community; and develop student and partner capacity for sustained engagement in particular areas of need for long-term and ongoing local sustainability challenges and opportunities. As the capstone course for the Haub School's Sustainability minor, enrolled students should achieve the key learning outcome of developing and implementing sustainability solutions in both their own lives and communities upon completion [46]. To achieve successful outcomes for both students and partners, the semester-long project assignment employs a highly scaffolded approach that provides iterative structure and support for students to build their capacity [47]. Scaffolded activities include project deliberation; reflection on change-making and group process; development of project management, communication, and mentor engagement techniques and platforms; weekly progress and planning reports; draft and final formal project reports and deliverables; culminating public presentations to mentors and key campus and community stakeholders; and an ultimate reflective assignment.

Successfully implemented projects have included but are not limited to a zero waste event pilot and guidelines; student food security summit and strategic planning efforts; diversity, equity, and inclusion action plan within an environmental studies academic unit; bicycle friendly university and community certification; campus "fix-it" space to repair clothes and household materials; laboratory fume hood energy conservation behavior change program; and building-level sustainability plan. Additionally, the groundwork for the University's inaugural participation in the Association for the Advancement of Sustainability in Higher Education's (AASHE) Sustainability Tracking, Rating, and Assessment System (STARS) emerged from this course. In fact, the University of Wyoming achieved the entirety of its "campus as a living laboratory" STARS credits through projects completed by Campus Sustainability course students. Projects span the range of sustainability credit areas accounted for by STARS, including academics, campus and public engagement, operations, and planning and administration [48]. Increasingly in recent years, the course has advanced projects for sustainability beyond the University to the greater community in which the University is embedded in Laramie, Wyoming. These community-engaged projects provide the main focus for this case study.

In addition to the Campus Sustainability course, the greater context of the University of Wyoming's own sustainability commitments informs this case. In 2007, the University of Wyoming joined the American College and University President's Climate Commitment (ACUPCC). The ACUPCC "provides a framework for colleges and universities to become climate neutral and advance education for sustainability" through the creation of climate action plans [49]. Two years later, as a requirement of this commitment, the University of Wyoming Campus Sustainability Committee created a Climate Action Plan under the jurisdiction of the former President, with the ultimate goal of reaching carbon neutrality on campus by 2050 [50]. As part of this commitment, the University conducted annual greenhouse emissions inventories. However, the University of Wyoming discontinued its participation in the ACUPCC and effectively abandoned its climate action commitment in 2018 due to University budget cuts and changes in leadership. Despite leaving the ACUPCC, the Campus Sustainability Committee continues to conduct annual emissions inventories and currently participates in AASHE STARS, receiving the lowest rating of bronze in 2019 [51]. Aside from the defunct 2009 Climate Action Plan, however, the University of Wyoming lacks any formal sustainability and climate plans and commitments [48]. As students in the 2018 Campus Sustainability course found, the University of Wyoming accordingly lags behind many peer institutions in the Mountain West and across the United States in terms of sustainability commitment and action [52].

Finally, as we are actively engaged in the context of this case study research and the autoethnographic methods we describe below, we reflect on our positionality [53] within these relevant campus and community contexts. The first author has taught the Haub School of Environment and Natural Resources Campus Sustainability course since 2013, bringing a long-term view of its trajectory to this research. Throughout that time,

she has served as a member and former co-chair of the University of Wyoming Campus Sustainability Committee. Additionally, she is the faculty advisor for the University's highly active student organization, the Sustainability Coalition. The second author teaches a similar version of this course in the College of Business that relies less so on intensive, mentored projects. (At one point in time, these two versions of the course were co-taught and cross-listed. However, due to the dissimilarity in the courses over the past decade or more, we focus only on the Haub School of Environment and Natural Resources course in this study.) He serves as the Vice President of the local community-based organization, Alliance for Renewable Energy and on the Environmental Advisory Committee, which is jointly appointed by the Laramie City Council and Albany County Board of Commissioners to analyze and advise on relevant local environmental issues [54]. Finally, the third author is a recently graduated student who completed an undergraduate honors thesis mentored by the first author that investigated the potential for a joint community–university climate action planning process in Laramie.

Notably, all three authors do or did represent the University in some fashion, either in academic or student roles. As previously noted, while students may benefit to some extent from academic supremacy [40], they often serve in bridging roles between university and community partners. Academic power is likely even further diminished for the third author, who was an undergraduate student engaging with professional community partners through this research. The second author is a non-tenure track faculty member who additionally serves within a community-based organization and committee relevant to this research, thereby acting in dual university and community roles. Despite unequal power dynamics within the academy (e.g., non-tenured faculty vs. tenure-track or tenured faculty) and university employees' residence within their own communities, however, scholarship related to the aforementioned discussion of academic supremacy suggests that their power as academics always dominates in community–university partnerships [13,55]. The first author squarely wears an academic hat within this research as a tenure-track faculty member and the Campus Sustainability course instructor; accordingly, she enjoys the power and privilege academic supremacy affords in this and other community–university partnerships. To help mitigate these power dynamics, we have “checked” this manuscript with key City of Laramie and Alliance for Renewable Energy community partners for accuracy and fair representation of their leadership role in this climate action partnership and received their approval, following best practices for enhancing equity in analogous community-based participatory research processes [39].

3.2. Methods

Methods include autoethnographic reflection on our own experiences engaged in this work, review of documents produced in the specific course under study and related community activities, and semi-structured interviews. These data emerge from three academic years (2018–2019; 2019–2020; and 2020–2021) of partnership between community mentors, stakeholders, and students. We sought and received approval from the University of Wyoming Institutional Review Board for all aspects of this research involving human subjects (Protocol #20200626RB02779).

First, we used autoethnographic methods that aim to understand the greater cultural context through our own personal experiences [56]. As our positionality statement indicates, we are all intimately involved in this research context in various ways. The first author, in particular, draws on her experience as the Campus Sustainability course instructor and facilitating student action with community partners. We augment and corroborate autoethnographic evidence and the case study overall with document analysis [41]. Documents include the reports and products students created for the various Campus Sustainability course projects, City of Laramie resolutions and recommendations, email correspondence with students and community partners, and related media pieces.

We conducted semi-structured interviews in summer and fall 2020 with $N = 10$ participants selected with purposive sampling methods based on their involvement with

aspects of the specific sustainability partnership of relevance to this case [57]. Participants were students who enacted the various course projects and community and university partners or stakeholders who directly mentored or otherwise supported these projects. Additionally (and due to their aforementioned direct engagement in this study context) the first and second authors participated in interviews conducted by another member of this research team to enhance systematic autoethnographic reflection. We selected interview participants for representative breadth across community, university, and student roles. We also selected participants to represent engagement across all three years of the community–university partnership and direct participation in or mentorship of all five course projects and three student internships, which we explain in detail below in the Results.

Table 1 further explains interview participants' roles relevant to local climate action and the context of this case study research surrounding the Campus Sustainability course. Community partners and mentors include members of the community-based non-profit organization, Alliance for Renewable Energy; City of Laramie employees; and the jointly appointed City of Laramie and Albany County Environmental Advisory Committee. These are the main community-based entities engaged in Laramie climate action planning and emissions reduction. University partners include both academic (i.e., faculty whose teaching and research engages with sustainability relevant to this partnership) and professional (i.e., non-academic personnel whose jobs interface with aspects of campus sustainability in ways relevant to this partnership) members. Finally, while technically university partners, we distinguish student participants to acknowledge their bridging capacity with community partners and diminished power relevant to other university actors—particularly academic ones [40].

Table 1. Interview participants classified by community, university, or student role(s) by year.

Participants	Community Partner/Mentor	University Partner (Academic)	University Partner/Mentor (Professional)	Student
1	Year 1, 2, 3 (City)			
2	Year 1, 2, 3 (ARE) ***			
3		Year 1, 2, 3 (Instructor)		
4				Year 1
5	Year 2 *		Year 3 *	
6				Year 2
7				Year 2
8			Year 2, 3 **	
9			Year 2, 3 **	
10	Year 2 *	Year 3 *; **		

* Indicates a participant serving in dual roles as both a community partner and a University partner (academic or professional/non-academic). Classification by year indicates the role in which each participant primarily engaged with the Campus Sustainability course and students during that particular year. However, we also recognize their role within the University, which may afford them additional power in relation to community partners. ** Indicates participants who engaged as secondary stakeholders and provided relevant interviews but did not directly mentor students. *** ARE refers to the Alliance for Renewable Energy.

All interviews occurred in summer and early fall 2020 at the end of Year 2 and beginning of Year 3 (which we explain below in our chronological sequence analytical approach and Results). Accordingly, interviews do not include student participants from Year 3; those projects were still in progress at the time of this writing. The three student interview participants include one representative who participated in each of the three projects that occurred in Years 1 and 2. Overall, this case study depicts the work of 22 students over time. Four students participate in each project, an additional student completed an honors thesis, and another served as a student organization representative on the Alliance for Renewable Energy board. These students primarily participate[d] in

the interdisciplinary Sustainability minor and/or other interdisciplinary environmental studies academic programs (e.g., Environment and Natural Resources, Environmental Systems Science). Some students additionally participate[d] in concurrent academic degree programs across the University of Wyoming, including Economics; Energy Resources; Engineering; Marketing; Mathematics; Merchandising and Textiles Design; Music; and Political Science. Professional, non-academic community and university partners do not necessarily approach this climate action effort through a disciplinary lens; rather, their participation is largely a-, post-, or transdisciplinary, which other community–university partnership case studies have demonstrated [58].

Semi-structured interviews followed an interview guide based on broad thematic questions that simultaneously allowed for more open-ended conversations with participants [59]. Interview guide (see Appendix A) themes and questions focused on local community and university climate action planning efforts. Questions specifically asked participants to speak to their own role in climate action and emissions reduction within Laramie and/or the University of Wyoming; the specific roles of students in these efforts; and the potential for a more formal community–university climate action partnership. Finally, we audio-recorded interviews, used a software application to generate verbatim transcripts, and manually corrected transcripts from those recordings.

3.3. Data Analysis

Drawing on ethnographic and case study approaches for data analysis, we triangulated these multiple data sources to generate patterns and explanations for our research question [60] surrounding students' roles and agency in local and regional sustainability transitions. Specifically, analysis centers on students' roles in (a) helping community and City of Laramie partners achieve specific climate action and sustainability goals through projects; (b) building or strengthening informal sustainability partnerships between the community and the University; and (c) presenting opportunities for more formal partnerships between the University and community or otherwise reinvigorating the University's own sustainability efforts. We use a chronological sequence approach to analyze these case study data. This approach allows us to describe how unique events unfolded in time and also how these events interrelated [41] to deepen a partnership and iteratively catalyze overall sustainability transitions. Additionally, a chronological sequence analysis directly responds to calls to infuse higher education sustainability transition research with a temporal dimension that examines change over time [7]. While this is a largely descriptive case study supported by a chronological sequence analytical approach [41], we additionally thread key aspects of community resilience, agency, and community–university partnerships from the above conceptual background throughout our analysis where relevant.

4. Results

We organize results through this chronological analytical approach across the three consecutive academic years constituting the partnership between students in the Campus Sustainability course and community partners in the City of Laramie's climate action process. Additionally, we organize results that speak to potential future activities into a fourth category of as-of-yet unrealized student action or broadly to student action across multiple years. All results synthesize our multiple data sources. Where possible and appropriate, we directly augment synthesized and summarized data with interview participant quotes. Our results do not comprehensively describe the entire Laramie climate action process and the role of all stakeholders involved. Rather, we specifically focus on students' unique contribution to that process in accordance with our research question.

4.1. Year 1

In 2018, a citizen group in Laramie, Wyoming, began exploring ways to reduce carbon emissions in the community both for environmental and economic purposes (e.g., cost-

saving energy efficiency measures). One community partner interviewee framed this motivation, saying:

As the state continues to have less and less money because of the downturn of our mineral resources, the cities and the counties are going to get less and less money. This really inhibits a city's ability to be able to invest in itself and to make investments that are going to pay off in the future . . . [these communities] want to have a say and independence over their energy future and community resilience.

Members of the—then informal—group included an organizer for a statewide non-governmental organization that “advocates for issues related to coal, oil, gas, and renewable energy” and the energy transition across Wyoming. The organizer would later become a central mentor and stakeholder across the three-year partnership. The group sought support from a variety of stakeholders, including the University of Wyoming Haub School of Environment and Natural Resources, as they embarked on this effort. As an academic unit, the Haub School aims to “aid people in making good decisions about environment and sustainability” through research and engagement as opposed to “advocat[ing] for formal policies”. As a result, academic partners steered the group toward the Campus Sustainability course to provide decision-making support through a student project to initially assess greenhouse gas emissions. A University partner said:

Before we go making resolutions, do we even know what Laramie's current emissions are? We don't have any baseline. We've never done a greenhouse gas emissions inventory in the City of Laramie.

In spring 2019, four students in the Campus Sustainability course worked directly with three key figures in addition to the instructor. These figures included a City of Laramie employee; a former co-chair of the Campus Sustainability Committee and Haub School of Environment and Natural Resources faculty member; and the community organizer above, who later jointly created the Alliance for Renewable Energy with other community members. The City of Laramie, Alliance for Renewable Energy, and Haub School of Environment and Natural Resources Campus Sustainability course entities form the central partnership we refer to in this paper. The former two representatives have served as project mentors or key stakeholders beginning in Year 1. With their support, students completed a baseline assessment of greenhouse gas emissions produced through municipal operations (i.e., only governmental sectors and not residential, commercial, industrial, or University sectors). Through a description jointly scoped by the instructor and mentors, the project specifically asked students to:

- Identify a rigorous calculator for municipal greenhouse gas emissions inventories.
- Work with the City of Laramie mentor to identify data sources and thoughtfully connect with City employees and officials for data collection.
- Collect all inventory data and enter it into the calculator to produce the inventory.
- Share results through a presentation and report with City and community stakeholders.
- Develop a data collection, entry, and presentation protocol for future emissions inventories.

Students encapsulated their efforts as developing a “set of tools the City of Laramie can rely on in the future to calculate their greenhouse gas emissions and aid them in setting and achieving their carbon neutrality goals”. Moreover, these tools are indicative of and contributed to developing the knowledge, skills, and learning relevant for community resilience. Students ultimately identified, selected, and applied the no-cost U.S. Environmental Protection Agency’s (EPA) Local Government Operations Calculator, which allowed them to inventory emissions from stationary combustion, mobile combustion, solid waste, wastewater, electricity use, employee commute, water, agriculture and land management, urban forestry, waste production, and additional sources. Baseline inventory results identified several municipal government departments and mobile vehicle combustion, electricity use, and solid waste as major emissions sources to target for future reduction.

After identifying additional revisions to the baseline emissions inventory and presentation needs with City stakeholders, one of the four students continued in a summer internship with the City of Laramie mentor in summer 2019. In addition to City mentorship, the student intern received concrete funding support provided by the Campus Sustainability Committee and Haub School of Environment and Natural Resources, which is key to ameliorating the structural barriers to community–university partnerships borne out in academic supremacy. The student explained her desire to continue and deepen her contributions to climate action assessment, extending her agency beyond what she cultivated in the project-based course:

I expressed to [instructor] that I really wanted to continue doing the work, because we didn't have enough time to fulfill the project as we had envisioned it. . . . I was just very happy with the opportunity to be able to do more than we had been able to complete throughout the semester.

The student presented a final baseline municipal emissions inventory to Laramie City Council alongside the Alliance for Renewable Energy. Both a community and a University partner described the student's internship as contributing to forward momentum for carbon neutrality in a way that helped disarm and diffuse tension indicative of students' potential bridging role in power-laden community–university partnerships:

Being able to interact with the City really directly through her internship—she helped to move this forward. The City Council was open to hearing from students, because they want students to engage in the community; they're a part of the community.

I think people like working with students. Sometimes things that are politically tricky, like climate action and carbon neutrality and emissions reduction, particularly in a state like Wyoming, and having students lead the way on that, I think reduces the potential tension . . . Our first intern, she was giving her presentation to City Council about the inventory . . . They asked her some really challenging questions, but she was so engaged in the project and really knew her stuff that she was able to politely and thoughtfully address all of those questions in a way that disarmed everyone. It's not that there were no challenges. I think having students in this role lowers the pressure level for everyone, and also gets some work done.

Following the internship, the student worked directly with the Environmental Advisory Committee to help create initial recommendations for emissions reduction and carbon neutrality, which occurred in Year 2.

One community partner interviewee encapsulated the informality—and benefit—of this Year 1 local government, community organization, and university partnership with students supporting free emissions assessment:

Primarily with the University, it's been this partnership with Alliance for Renewable Energy, the City, and the Haub School sustainability course. That has been really big, and it's been done kind of "scrappy" . . . A lot of cities will pay thousands of dollars for consultants to come in and do the emissions inventories. However, we've done it super grassroots and super scrappy. The first inventory that was completed was the municipal inventory. That was completed through a free EPA calculator online with the students primarily doing the work.

This statement reflects the benefit of informal HEI participation in regional sustainability partnerships and the importance of students' bottom-up action in this case and context.

4.2. Year 2

Rapidly following the successful baseline municipal emissions inventory project and the summer intern presentation garnering support from Laramie City Council, Alliance for Renewable Energy and City of Laramie partner-mentors reconvened with the Campus Sustainability course instructor. They identified two additional projects, one primarily

mentored by each partner, for the spring 2020 course: additional assessment through a community-wide baseline emissions inventory and a municipal emissions reduction plan. A community project mentor described the ability to expand on previous climate action work in Year 2 as “a really sustainable and great partnership” between the community and University, despite its relative informality. The increasingly sustainable nature of this partnership over time also demonstrates the development and strengthening of social networks necessary for community resilience.

Prior to launching these two student projects, and just as the course began in February 2020, the Environmental Advisory Committee developed recommendations to achieve Laramie carbon neutrality by 2050. Recommendations included setting emissions reduction goals for municipal operations and community-wide emissions in ten-year increments; drafting corresponding comprehensive plans; performing regular emissions assessments; implementing outreach via, for example, a webpage and engagement campaign; providing training to personnel; exploring private, donor, and grant financing; and a range of sector- and activity-specific emissions reduction targets. Information gathered by students in the Year 1 project and internship provided grounding for these recommendations, but community-based advocacy drove their pursuit. As one community partner who serves on the Environmental Advisory Committee put it:

We serve as an advisory committee to the City. So, if there are environmental concerns for maybe certain legislation or projects coming up, they will be referred to us for recommendations and suggestions . . . When the carbon emissions and carbon neutrality came to the City, it was referred to us to try to come up with some recommendations.

Following these recommendations, as an Alliance for Renewable Energy organizer stated, “City Council drafted a resolution and passed it in March of this year to be carbon neutral by 2050”. She further explained the overwhelming support for the resolution at a Laramie City Council meeting, which points to the engaged governance characteristic of community resilience:

We weren't expecting for the resolution to go carbon neutral by 2050 to pass unanimously. We were expecting maybe three or four no votes, but it did pass unanimously . . . Alliance for Renewable Energy has packed the room with people. There's people downstairs in the basement, in an overflow room, watching it. I think empowering citizens with information and also giving them an opportunity to engage really can do a lot in terms of changing the hearts and minds of elected officials.

Notably, current and former Campus Sustainability course students and members of the University of Wyoming Sustainability Coalition student organization engaged in this meeting and action process. One student who participated in both a course project and served as a member of this student organization described students' participation in the Laramie City Council meeting:

There was a good number of students. I remember them saying at one point, “we have a lot of young people in the crowd”. They don't usually. I think the involvement around the climate action processes involving the younger people more than they had previously seen before—I think they were pretty pleased about it. People went up to talk, and I think it was really good.

The adoption of the carbon neutrality resolution allowed Campus Sustainability course students to witness the importance of their projects and climate action in real time and—much like the show of support from citizens described above—engage in governance for community resilience. The first project, a community-wide baseline greenhouse gas emissions inventory, directly expanded on the Year 1 municipal greenhouse gas emissions inventory. At a conference on climate change and carbon neutrality in Mountain West communities, the Alliance for Renewable Energy mentor connected with the Local Governments for Sustainability or “ICLEI” network, further supporting expanded social networks for community resilience. She arranged for a student project team to participate in their

guided inventory calculator “ClearPath” course, which she described as, “a very legitimate emission tracking software to produce a baseline inventory entirely for free”. A similarly jointly scoped description allowed students to:

- Participate in the ICLEI MT2030 greenhouse gas emissions inventory cohort weekly webinar series.
- Based on ICLEI guidance, gather and input data from all community sectors into ClearPath, a cloud-based emissions calculator.
- Based on data gleaned from the inventory process, share results and make recommendations to ARE and other relevant stakeholders (i.e., presentations to Environmental Advisory Committee; Laramie City Council) for next steps in emissions reductions, carbon neutrality advocacy, and climate action planning.

Similar to students who completed the Year 1 assessments, Year 2 students described their purpose in this project as helping the City of Laramie to move “toward planning to reduce its carbon footprint and achieving emission reduction goals . . . and serve as a guide for a yearly greenhouse gas inventory for the City of Laramie to ensure continuous improvements”. This project further provided a basis for community knowledge, skills, and learning surrounding climate action for resilience. Through the ICLEI ClearPath cohort, students assessed municipal, residential, commercial, and industrial sector energy, transportation, agricultural processes, consumption, upstream activities, solid waste, water treatment, and water supply. They additionally received guidance on scoping, data collection, data entry, and quality assurance. The assessment found industrial and residential energy were the greatest emissions source categories.

A student member of this project team further articulated their purpose and also related it to both her own and the community’s real-world learning and action. Her statement below demonstrates how project-based learning can support student agency beyond the HEI and classroom itself:

Here’s where you’re at, and you want to get to zero. How are you going to make that happen? . . . That was really fun, and I learned a lot more in a whole different way . . . We had a peer mentor who was part of a whole different group. We basically learned so much from this other entity...The autonomy was rewarding to see the product of your labors at the end of it. Not just, “I sat in class and I took a test”.

In addition to the expanded assessment of community-wide emissions, the Alliance for Renewable Energy community mentor described this project’s contribution to future climate action planning. The students’ project contributed to the City of Laramie’s commitment to ICLEI, thereby allowing them to directly affect change and expand social networks for community resilience:

That actually led to Laramie signing up to be a member of ICLEI, where we can continue to use their emission tracking software as well as help with climate action planning and have their review and expertise. So, the City actually “bought in” after that community baseline inventory.

According to an Environmental Advisory Committee member, the purpose of the recommendations in the aforementioned resolution, “was to create a comprehensive plan for the municipality and a separate comprehensive plan for the community, because they’re really two totally different things. With that recommendation, the City has taken that to heart, and are working on those plans now along with students [in the] class”. The second Year 2 project focused on the comprehensive emissions reduction plan for the municipality, moving student involvement beyond initial assessment and learning to supporting planning for substantive climate action. That jointly scoped project asked students to:

- Investigate other similar communities that have made emissions reductions in municipal operations, including challenges and best practices.

- Complete stakeholder interviews to understand local emissions inventory history and barriers and opportunities for municipal emissions reduction.
- Develop specific, targeted activities in line with Environmental Advisory Committee recommendations and aimed at both the most pressing emissions sources and low-hanging, easy-to-implement opportunities.
- Synthesize findings to develop a phased municipal emissions reduction plan based on short-, mid-, and long-term actions to meet recommended emissions reductions goals and benchmarks. Consider factors including cost, political viability, and ease of implementation.
- Share results and make recommendations to the Environmental Advisory Committee and/or Laramie City Council.

Mid-way through the course in spring 2020, however, learning activities rapidly moved online due to the global COVID-19 pandemic. As a result, students shifted from a full municipal emissions reduction plan to an outline and decision-making tool for future planning efforts. One student articulated the initial goal and subsequent change to evaluating action in the following way:

We were going to actually create an implementation timeline for the project, basically using certain action items: this is when it could be completed by, this is the social impact that it will have, the environmental impact, as well as an economic analysis, the cost and benefits, etc. Due to COVID, those things and plans changed, because we weren't able to meet with City officials, which was kind of a crucial part of determining some of those impacts as well as implementation strategies . . . We created a matrix that listed different action items based on emission sector for the City of Laramie. Based on the GHG ("GHG" refers to greenhouse gas, and we only use the acronym in this paper when it appears in a direct quote; otherwise, we spell out the full term.) inventory that students from the previous year did, we could kind of identify "sectors", as they call it, that needed improvement or areas that we could look into. We basically identified those sectors and created action items based on each sector and identified: here's the potential timeframe that we have. Is it going to be a long-term project? Is it short-term? Is it mid-range? What kind of collaboration would have to happen? What staff would need to be included? What is the potential impact of that as far as emissions reduction goes? Is it a low-impact action item? Something that can be achieved easily? Is it something that could really dramatically reduce our emissions in certain sectors?

Despite the initial project being "derailed due to COVID-19", a community stakeholder still described students' work in this project as, "helping tremendously to put together additional emission reduction planning". The project supported both substantive action planning and further knowledge, skills, and learning development. Similar to the Year 1 project extension, one student member of this group continued in a paid summer internship mentored by the City of Laramie and funded by a competitive process through the Campus Sustainability Committee and Haub School of Environment and Natural Resources. As the City of Laramie mentor explained, the student engaged in "future forecasting and modeling for the City emissions model through ICLEI [ClearPath]". She explored emissions reduction impacts for a proposed lease of City land for a large solar electricity array and electrification of municipal fleet vehicles. Community and University partner interviewees further connected her internship to substantive changes in municipal policy and an ongoing pattern of partnership, which suggest both the relevance of student agency—the actuality of taking planned action to effect change—and enhanced social networks key to community resilience:

We have modified our purchasing policy now at Public Works. So, we look at emissions as one of our criteria for purchasing any equipment, or even heavy equipment, which is brand new. That just started this year at the City of Laramie...We're looking at things very different.

We've started to establish this pattern, and I hope and think we'll continue to do that to support the City and its work over the next academic year.

4.3. Year 3

Following Laramie's mounting climate action strides and shifting from Year 2 into Year 3, a student honors thesis explored the potential to (a) reinvigorate a University of Wyoming emissions reduction commitment; and (b) partner with the City of Laramie in a climate action planning process. Despite the fraught town-gown relationships and power imbalances hinted at in the excerpts below, both University and community stakeholders stressed the need for such a partnership:

The City is further ahead of the University at this point in terms of emissions and climate action. They have a commitment. They have goals. They're moving forward on a plan. I think that, in concert with students who have been leading the way on this already, now is a really good time to explore what the University could do. Can the City put pressure on the University? "Hey, we're moving forward. Don't you want to move forward with us?" I think that this is a really opportune time, with new leadership at UW and the City making such excellent strides, to reinvigorate and re-explore a climate action commitment and plan at UW. ("UW" refers to the University of Wyoming, and we only use the acronym in this paper when it appears in a direct quote; otherwise, we use the full name "University of Wyoming" or "University".) Is there a joint community-university approach to this? Could we be involved in the City's efforts? Could we look at efficiency and energy reduction and waste together, since we're all part of the same community?... Perhaps new leadership will see this as an investment in our future.

[With University leadership], frame it as "look at what the City is doing right now", and use the City as a model. I think the City is actually hungry to have a partnership with the University. We've talked about it in multiple EAC meetings . . . It would be great if the University took a step forward and said, "let's work on this together". I think the City would welcome that and make a great partnership.

Four stakeholder recommendations for a climate action partnership emerged in this thesis project:

1. Create a joint community–university cost-benefit analysis for shared emissions reduction actions.
2. Obtain leadership buy-in and identify a university "champion" for climate action.
3. Create a paid sustainability coordinator position at the University of Wyoming.
4. Create and support opportunities for outreach and education through additional student projects.

Findings concluded that according to participants, the City of Laramie seems willing to collaborate with the University of Wyoming on climate action planning and emissions reduction. Using the four recommendations, the thesis suggests "both the University of Wyoming and Laramie have an opportunity to work together to create a sustainable future".

Building from the emphasis on community–university climate action partnerships and student action in course projects over the previous two years, the Alliance for Renewable Energy invited an alumna of the Campus Sustainability course to serve on its board in January 2021. The Alliance for Renewable Energy mentor explained this invitation, stating, "We have had many discussions as a board about the need for our group to continue and increase our collaboration with both the University and younger folks throughout Laramie". The student is also a leader in the Sustainability Coalition organization, which has augmented and amplified student action through the course. This involvement demonstrates how student sustainability extracurricular organizations can bridge curricular action not only within HEIs, but here, beyond them into the greater community. For example, the organization has encouraged student attendance at Laramie City Council meetings

focused on the adoption of emissions and climate resolutions and collaborated with the Alliance for Renewable Energy on large-scale composting efforts that would reduce solid waste greenhouse gas emissions.

With these early collaborations in Year 3 and much like Year 2, the City of Laramie and Alliance for Renewable Energy once again partnered and jointly planned two Campus Sustainability course projects which are nearing completion at the time of this writing. These continued projects further demonstrate the strengthening of social networks for community resilience through this informal partnership. One project aims to identify and recommend local renewable energy incentives for commercial and residential sectors in Laramie. The other project builds directly on the findings from the above honors thesis to develop and implement a community–university climate action planning partnership campaign with multiple stakeholders. The latter project additionally engaged a member of the Campus Sustainability Committee and Environmental Advisory Committee as a co-mentor.

Further contributing to engaged governance, the local renewable energy incentive project specifically explores and recommends local, state, and federal tax credits, grant programs, and voluntary commercial certification programs to support rooftop photovoltaic (PV) installations. For several Laramie City Council members and employees, this is a top priority for concrete emissions reduction action. The project description specifically asked students to:

- Identify any existing federal- and state-level incentives applicable for rooftop solar and/or energy efficiency at the local level.
- Explore incentive structures in other comparable communities.
- Gather input from relevant stakeholders to identify opportunities, challenges, and barriers related to incentivizing rooftop PV.
- Synthesize findings from the above activities to create a clear, concise recommendation for the City of Laramie to consider through concrete products.

The community–university climate action planning partnership campaign engaged students to:

- Investigate joint community–university climate action planning efforts in other comparable locations.
- Communicate with University and City/community stakeholders to assess opportunities for collaboration on commitments, planning, and specific emissions reduction strategies.
- Develop a clear, concise message and “ask” for University of Wyoming leadership to reinvigorate a climate action plan, ideally in collaboration with the City. The ask will likely involve an elevator pitch/presentation and visually engaging information sheet. Students should consider messenger(s) for the “ask” and how to cultivate community support.
- Depending on the results of the ask, begin to outline a joint community–university climate commitment.

Specifically, students have identified three scenarios for future climate action: “(1) UW and the City of Laramie decline a joint climate action plan, and UW continues without any climate action commitment; (2) UW and Laramie each pursue separate climate action plans; or (3) UW and City of Laramie partner for a joint climate action plan”, either through technically separate plans with key areas of overlap or a fully joint partnership. At this time, these students have presented to and have garnered letters of support for a community–university climate action planning partnership from the Alliance for Renewable Energy Board, the Associated Students of the University of Wyoming (i.e., student government), the Campus Sustainability Committee, the Sustainability Coalition, and the University of Wyoming Shepard Symposium on Social Justice. They additionally presented to the Environmental Advisory Committee, which went so far as to suggest that a commitment and partnership should include the City of Laramie, the University of Wyoming, and

Albany County, the latter of which has not yet engaged in climate action efforts. Partners and mentors plan to present recommendations and letters of support to both University of Wyoming and City of Laramie decisionmakers upon completion of the project. This particular project demonstrates students' unique role as sustainability change agents by potentially bridging a climate action partnership between the University and community.

At the time of this writing, a student member of the local renewable energy incentives project group is preparing for the third consecutive City of Laramie summer internship funded by the Haub School of Environment and Natural Resources. Again, that continued funding helps to materially alleviate inequities inherent in community–university partnerships. That student will support the now annual greenhouse gas emissions inventory update, continue to draft a municipal emissions reduction plan, and support the City and Alliance for Renewable Energy to develop a regional climate action framework with a cohort of other Mountain West communities.

4.4. Year 4+

A fourth year of community–university partnership and student action through the Campus Sustainability course is thus far unrealized, but partners anticipate it will continue in academic year 2021–2022. Already, City of Laramie and Alliance for Renewable Energy partners have identified potential projects for the spring 2022 iteration of the course. For example, one project may aim to develop energy efficiency outreach and education for Laramie's residents. However, results organized into Year 4+ primarily include instances in which participants directly spoke to the possibilities for future student action and broader sustainability transition that could emerge through ongoing partnership. Additionally, Year 4+ results include participants' discussion of overarching contributions from student action spanning across the multi-year partnership.

Participants discussed specific ways to both facilitate a climate action planning partnership between the University and City and more simply reinvigorate climate action at the University, alone. A student who participated in a Year 2 course project discussed the need for formalizing not only a partnership but better enabling student engagement in a formal partnership, saying, "If they had a taskforce . . . and City officials created that and had students on board in that process, I think it would help". The ability for students and other partners to engage in joint governance could further enhance this aspect of community resilience and more directly include the University as an actor in resilience efforts. Another student who completed a project in Year 2 emphasized how integral students are to a joint community–university process and potentially improving town–gown relationships:

If they want to reach net zero by 2050, they're going to have to work together. I think there is space for collaboration there, especially with students who are so heavily involved in the sustainability aspects. I think students want to get involved in town. I think there probably is a little bit of pushback from the residents who live here full-time. They see us as short-term residents and stuff like that. I do think there is potential for that. I think they have a pretty okay relationship. I don't think it's filled with animosity, but I think it probably could be better.

Speaking directly to the current lack of any analogous climate action commitment or plan at the University in contrast to the City, one Year 2 student spoke to students' roles in driving university-level change:

A lot of stuff can come bottom up as well, but in order for us to stick to a plan and commit to something, I think it has to come from upper administration for sure . . . The only way to pressure that is by having massive support from the student populations.

Some University stakeholders, however, specifically spoke to barriers to a community–university partnership due to a historically fraught town–gown relationship, saying, "We've had a tenuous, at best, relationship with the City over the years". Another said, "Just in the past couple months, there's some pretty high charged issues that are bringing about some pretty heavy confrontation...The University's got some pretty entrenched

positions". Still, they similarly spoke to the role of student action for moving outside of formal governance and administrative structures to overcome barriers to partnership and advancing University climate action planning:

I think if it came from students or from a student organization, that would carry more weight. The administration tends to listen to the students, if you're organized and have a group and communicate that it is a priority that you would like to see work done . . . Let the administrators know that's a priority that students want to see addressed.

In particular, one University stakeholder highlighted the role of student projects in the Campus Sustainability course as a "good springboard for initiatives like this", suggesting that project-based learning can cultivate student agency beyond the classroom. A City of Laramie employee echoed this sentiment of a tenuous relationship for sustainability and climate action planning, other than through the Campus Sustainability course. However, he added the following statement evoking both fraught partnerships and academic supremacy:

We would love to work with them [the University]. I think the ultimate end goal is to have a community plan and combine everybody, but at least for right now, the City is waiting for the University to be willing to partner . . . Hopefully we can provide the template to where others can join us in the future . . . If the University decided they were going to reenact their climate plan, they'd certainly find a willing partner in the City. We would be a hundred percent right there ready to work with them.

One of the other main ways in which interview participants discussed potential future sustainability transitions is the ability for Laramie's climate action planning process to catalyze similar processes in other communities across the state. Some spoke directly to the fact that students have been a part of the process of driving other transitions, using Laramie as a "pilot" location. One community partner said, "if the City and the University were to partner, they could become a model not just for the rest of the state but for other universities and communities to work together". For example, Jackson now marks the second community in Wyoming to pursue a formal climate action commitment. Already, the multi-stakeholder Jackson Hole Climate Action Collective has partnered with the first author for a similar informal partnership through student project-based learning for supporting community partners with their planning efforts. In both Laramie and across the state, students are beginning to serve as relevant change agents alongside community leaders in regional sustainability efforts.

In addition to the chronological progression of student action through course projects, participants discussed student action more comprehensively, spanning across the multi-year partnership and indicative of overall course goals. One University partner described how the Campus Sustainability course aims to teach students "what it takes" to effectively make lasting sustainability change and empower them to do that through their learning process. Essentially, the course allows students to develop both the value-informed agency (or praxis) and knowledge, skills, and learning necessary for community resilience. While participants acknowledged students did not necessarily cause sustainability change in the community (i.e., municipal and community stakeholders served as the key leaders for change), they facilitated the process. For example, the Alliance for Renewable Energy has stated in documents, "We strongly believe that the work completed by UW students has enriched Laramie's path to a renewable and efficient future through providing a collaborative and engaging approach to emission tracking and planning". An Alliance for Renewable Energy community partner further described students' role in local climate action and how that action simultaneously allows students to view themselves as change agents:

I actually think that students have been a big part of Laramie's passage of the carbon neutral resolution. I think students were actually the most instrumental driving force. I think for one, students' ability to talk about their concerns, about the fact that they are the ones inheriting Wyoming's energy future. They are the ones inheriting climate change

and the impacts that will come from that. They are really powerful and strong... [The projects provide] the opportunity to intern and do hands-on work that's going to be used immediately and continue to be used and updated. I think for students, the opportunity to do actual community work that makes a difference, instead of working in some "ivory tower" not attached to the work is important. Here, they can see the payoff.

Others, including a community stakeholder and community project mentor, talked about Campus Sustainability course students' unique roles as University stakeholders who can help catalyze and accelerate the climate action process and informal community–university partnership for these local sustainability transitions:

My experience was that students seem to be the catalyst ... for actually something happening ... It seems as though students are doing a lot of the research and the computations and trying to implement some of our recommendations. That also came from resources from students ... The University creates this opportunity to have that work done at reduced or oftentimes free cost to the City ... Try to remove that "ivory tower" type mentality where we're separate ... I think we need the students' energy and enthusiasm and optimism. The longer you are in City government and administration, the less of that stuff you have.

I think the collaboration between the City and the University's Haub School is excellent. It's brought some really amazing young folks into our awareness that we didn't know were there that have done some amazing things. I think that the collaboration is good—the ARE folks and the EAC, and we're getting so much support from the community. There hasn't been a lot of pushback. My goal is to just not lose the momentum, because right now, we're getting things done. We're getting things done at a pace that's more rapid than I thought it would be, especially at the government level.

One student summed up the value of student action through sustainability project-based learning as it extends outwardly into the community and, perhaps, for acknowledging and strengthening the University's place within the local community:

A lot of students are passionate about the work that they're doing, especially the sustainability work. There is that passion, but there is also that background of, "I have skills to do this and I can help you do this". Maybe students won't be involved a hundred percent or throughout the whole emissions reduction planning for the City of Laramie, but I think they can be a very critical part for it. The University of Wyoming is a community within the greater Laramie community. I only see that as a great opportunity for both the University and the City. I've also seen so many more students being more actively involved within the City, whether that is through projects in the Campus Sustainability class or not. There is this bigger push of, "all right, we're working within the University but also the City of Laramie, and in this case, our community".

Students, like this one, developed knowledge, skills, and learning and enhanced community–university social networks as engaged change agents through their projects and beyond them.

Finally, mentors visited the Campus Sustainability course at the beginning of the semester in spring 2021 to introduce Year 3 projects to students. The City of Laramie mentor shared with the class that this multi-year connection with students has been one of the—if not the—single most positive and successful sustainability partnerships between the Laramie community and the University of Wyoming.

5. Discussion

These results present three years of student contributions to community-engaged climate action projects through the Campus Sustainability course and related activities with local government and community organization partners. Year 1 assessed climate action opportunity and need through a baseline municipal operations greenhouse gas emissions inventory. A student summer intern then advanced this project to support early

Laramie City Council and community engagement for local climate action planning work and commitments. Year 2 entailed student advocacy alongside community organizers and citizens to affirm a City-wide carbon neutrality resolution and commitment. Additionally, students completed a course project in the second partnership year for additional assessment of opportunity and need with a community-wide greenhouse gas emissions inventory that built upon the Year 1 municipal inventory. They also completed a project that began to outline and plan for specific, local climate actions, extending project work beyond assessment. The Year 2 internship examined scenarios for some of those specific action areas. In Year 3, student projects further built on the previous two years to recommend specific renewable energy incentives for climate action. Moreover, students engaged in direct implementation of action through campaigning and advocacy for enhancing community–university partnerships.

In addition to the action advanced by students with partners in the first three years, participants spoke to future opportunities for student action. These included opportunities for and barriers to more formal climate action partnerships between the community and University of Wyoming; catalyzing similar climate action efforts in other communities across the state; and the general impact and potential for student action across the multi-year partnership. Year 4 represents the as-of-yet unrealized potential for student action to contribute to further local and regional change. Taken together, these results demonstrate how students iteratively contributed to local climate action in Laramie over time, with each year building upon and expanding action capacity from the previous year. Figure 1 visualizes the dynamic nature of this multi-year transition and change agent process.

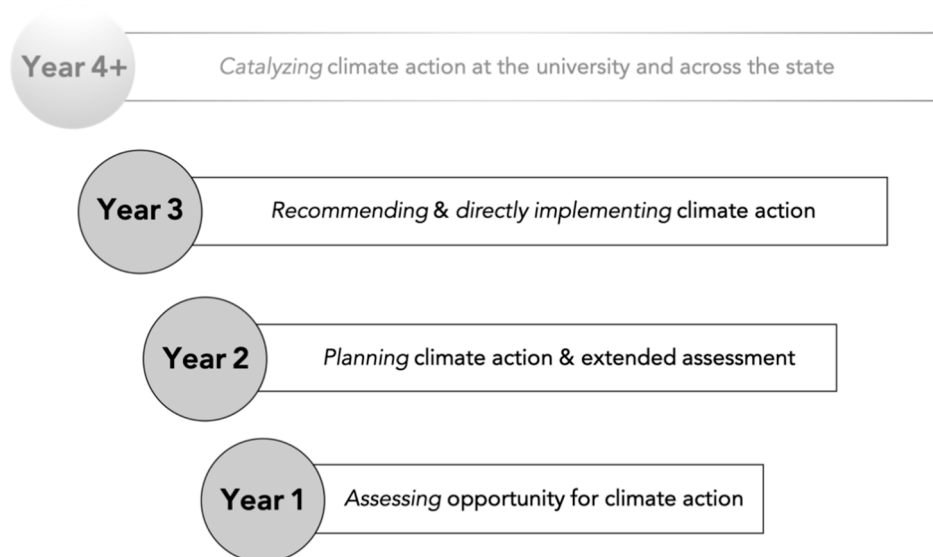


Figure 1. Campus Sustainability course student contributions to climate action in Laramie over time.

Our results show that students played a vital role as change agents in Laramie’s climate action and ongoing sustainability transition alongside other key community stakeholders. In our case, students directly partnered with and supported local government and community-based organization stakeholders’ climate action leadership. Student agency was a necessary (though not sufficient) aspect of transition; community stakeholders led this work but gained further momentum and resources from student support. Returning to community resilience frameworks, students contributed to planned action in concert with stakeholders to effect change [19], leveraging key resilience characteristics [20]. Specifically, they strengthened social networks by forging a multi-year informal partnership between the community and university; engaged governance by interfacing with the Environmental Advisory Committee and Laramie City Council; and knowledge, skills, and learning by supporting foundational assessments and planning through project-based

and community-engaged pedagogies. This local sustainability transition research gained conceptual depth through the application of a community resilience framework. As Hoinle and co-authors [37] similarly found with niche-level transition phenomena, student action allowed for testing and boundary-pushing within the community or regional sustainability context in the absence of more formal community–university sustainability partnerships. Particularly with niche phenomena like those depicted in our case, social-ecological and community resilience frameworks provide appropriately scaled perspectives for localities and regions. We recommend the further application of community resilience conceptual frameworks within HEI-focused regional sustainability transition research.

In addition to the contributions scale-appropriate community resilience frameworks can make to scholarship on partnerships between HEIs and local communities for sustainability transitions, this case study also contributes to a dearth of empirical research on the key mechanism of agency in community resilience [21]. Our findings suggest that agency for resilience is not uniform across all actors within a community and is subject to specific political, economic, and contextual drivers and barriers. Here, those drivers and barriers include the novelty of municipal carbon neutrality resolutions in a fossil fuel extraction-based state economy, a turn toward emissions reduction in the face of declining state revenue for municipalities, a lack of a formal University climate action commitment despite a community-based commitment, and strained town–gown relationships. Students demonstrated the agency key to community resilience [20] by supporting community actors in climate action efforts, all of which occurred despite these various barriers.

Beyond contributing to the community resilience literature, we argue the social theory construct of agency deserves greater attention in research on HEIs as sustainability transition change agents—and that this case study offers a jumping off point for further empirical exploration. The power dynamics inherent in agency as the socioculturally mediated capacity to act [25,26] coupled with our results urge keenly attending to *whose* agency is driving HEIs roles for regional sustainability transitions in specific contexts and under particular conditions. Students were the pivotal change agents on behalf of the University—not high-level administrators, staff, or faculty who more typically play “frontrunner” or “champion” roles in regional and sustainability transitions [8] (p. 182). While student-led sustainability action within HEIs experiences challenges due to power imbalances within universities [33], students’ more nimble, informal roles outside of formal university administrative structures were actually advantageous in this case. Our case demonstrates students can serve as informal partners and change agents especially where formal partnerships do not exist, town–gown relationships are fraught, and the greater economic and political context otherwise lacks alignment with sustainability transitions. Following previous investigations of academic supremacy in community-based participatory research [40], Campus Sustainability students played a bridging role for community–university partnerships for Laramie climate action. Importantly, this bridging work entailed providing structural support to community partners on behalf of the University, including long-term student time and resources through the course and paid internships. Following previous research [13], these are concrete ways to reduce inequalities and ameliorate academic supremacy in community–university partnerships for sustainability.

Reducing inequalities and ameliorating academic supremacy also require recognizing that universities are embedded in their greater social-ecological communities and repairing town–gown relationships. Student action helped to achieve these objectives in our case, however, partnerships should not perpetually be students’ burden to bear alone. We view stronger and more formal community–university partnerships as key to enhancing sustainability in Laramie and throughout Wyoming. Our results demonstrate that student action may be one pathway not only for sustainability transitions themselves but also for laying the groundwork for those more formal—and ideally, equitable—community–university partnerships. However, at the time of this writing, those future, formal, and more equitable community–university partnerships remain unrealized potentials.

Participants envisioned that those potential efforts—perhaps supported by future Campus Sustainability course projects and other community–university partnerships—*could* help catalyze community sustainability transitions across the state. Again, to our knowledge, the City of Laramie was the first community in Wyoming to adopt a formal carbon neutrality resolution and launch a climate action planning process. Any formal partnership is yet to officially come to fruition though, so students’ change agency in community-based sustainability transitions across the broader region currently remains unrealized. As Hamilton and Spalding [30] (p. 28) note, however, change agency leadership requires becoming “comfortable with knowing that systemic change cannot be fully tracked. Emergent transformation occurs in its own time and may not be easily recognizable until it has already occurred”. We find both a formal community–university sustainability partnership and statewide climate action in our context to be such potentially emergent transformations. We also find that our investigation of the multi-year partnership that emerged through the Campus Sustainability course over time is a dynamic, processual contribution to sustainability transition research, for which other scholars have urged [7]. We similarly recommend further empirical research on whether and how change occurs over time in sustainability transitions.

The aforementioned unrealized potentials and emergent transformations prompt us to consider how partners can actively foster more institutionalized community–university cooperation while simultaneously honoring and supporting students’ agency. Building directly from a student suggestion depicted in our results and burgeoning outcomes from the Year 3 community–university climate action planning partnership campaign student project, one potential concrete strategy is forming an ongoing community–university climate action taskforce comprising equitable community, student, and professional and academic university partner membership. Another potential strategy emerging from the partnerships in this case—and currently under investigation by the first author, colleagues, and community partners—is scaling up efforts beyond course-based projects through an institutionalized, statewide community resilience and sustainability fellowship hub at the University. This approach would provide ongoing annual coordination, networking, and mentoring platforms to support paid, clustered community, faculty, and student fellows to address needs identified by and with statewide community-based organizations. Once again, formal, institutionalized community–university partnerships of these sort would require keen attention to reducing academic supremacy’s structural inequalities between partners and directly fostering student agency. Equitable and representative taskforce membership composition and paid fellowships that materially value community and student members’ time would help to address these power imbalances. These strategies would also avoid making students’ agency invisible or purely instrumental by providing them space as true partners in more formal sustainability efforts.

This research is not without limitations. We investigated a singular case, albeit one that extends across several years and iterations of the Campus Sustainability course. While case study research explicitly aims to examine an individual case to illuminate other related cases [61], we recognize that the political and economic context of a singular land-grant university embedded in a fossil fuel extraction-based state economy is unique. While perhaps less extreme elsewhere, however, these challenges likely do exist to some extent in other contexts. Future research should examine and compare similar cases of student action and agency through project-based learning in HEIs’ regional sustainability transition roles across numerous community–university contexts, including those in which more formal partnerships for sustainability and climate action exist. Additionally, this case did not focus on the instructor’s or community partners’ agency per se or in interaction with students’ agency. However, these actors helped to maintain the stable through-line necessary for a multi-year, informal university partnership and enabled student action within it. As Kopp [18] (p. 8) recommends, basing an entire transdisciplinary sustainability partnership on individual relationships alone is tenuous, as it will “never reach its full potential if stakeholder networks must be built anew when investigators leave an institution

or grants end". We also suggest future research should more explicitly examine multiple HEI and community stakeholders' interacting roles and agency for community resilience and sustainability transitions.

6. Conclusions

In conclusion, we found that students played a vital and catalyzing role in building and strengthening informal community–university partnerships in support of a local climate action planning process. Campus Sustainability course students served as change agents who supported the community-based stakeholders leading these sustainability initiatives through project-based learning. This research addresses a gap in the literature by examining students' agency beyond their own learning and within HEIs to instead focus on the impact of their sustainability action within the local community. It also addresses a dearth of empirical research on agency within community resilience and shows that agency varies across actors and according to political and economic contexts and power dynamics. Student agency is integral to the University of Wyoming's role in the local sustainability transition presented in this case study, particularly in absence of formal community–university partnerships. Practically, we suggest this research on student action can help reinvigorate and catalyze a joint community–university climate action planning process and contribute to improved and equitable town–gown relationships in our context. Connecting back to the original intent in the Campus Sustainability course syllabus, students helped to sustain engagement with community partners in particular areas of need for long-term and ongoing local sustainability challenges and opportunities. We hope that this engagement continues to chart a more sustainable future in Laramie, Wyoming.

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Appendix A

1. Please introduce yourself and describe your role within [insert university/city/community organization].
2. Why are you interested in sustainability and climate action/emission reduction, broadly?
3. Tell me about your past and current involvement with sustainability efforts at [university/city/community organization].
4. In particular, please tell me about the climate action/emissions reductions plans you have helped to implement or maintain at [university/city/community organization].
Possible prompts:

- When and how were these plans created?
 - How do the city and the university work with each other on climate action/emissions reduction, or not?
 - What challenges have you faced in the climate action planning/emissions reduction process, and how have you handled them?
5. Please describe the role of students in the climate action planning/emissions reduction process.
 6. What are your needs, concerns, and/or hopes for climate action planning/emissions reduction and sustainability at [insert university/city/community organization]?
Possible prompt:
 - What potential do you see for the University of Wyoming to reinvigorate a climate action commitment and plan, given the City of Laramie’s recent emissions reduction achievements, either its own or jointly with the community?
 7. Anything else you’d like to add?

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