Hackathons:
A Modular Community-Engaged Learning Experience*

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ABSTRACT

This paper presents the implementation of hackathons as a flexible, modular approach to community-engaged learning (CEL) in undergraduate economics education. By integrating hackathons into an advanced data science course, I demonstrate how this format lowers barriers to CEL adoption and enhances student learning, equity, and engagement. Drawing on three case studies, the paper explores the pedagogical value of hackathons, describing their adaptability and capacity to foster problem solving through collaboration with community partners.

* *I gratefully acknowledge the invaluable support and feedback from Mario Solis-Garcia and Alicia Atwood. I am also extremely grateful for the professional support of my colleagues at the Harward Center and community partners in the Lewiston City Department of Economic and Community Development, Healthy Androscoggin, and Lewiston Housing Authority. Most of all thank you to the Winter 2024, Fall 2024, and Winter 2025 cohorts in ECON/DCS 368 for your willingness to experiment with me. I can only hope you learned as much as I did in our time together.*

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1. Introduction

Community-engaged learning (CEL) projects allow students to address real-world challenges while supporting community organizations through their coursework. These projects improve learning across disciplines (Warren, 2022) and receive positive feedback from students, faculty, and community partners (McGoldrick & Ziegert, 2002). Within economics, CEL helps promote economic literacy, and improves retention -- especially among underrepresented groups in the discipline (McGoldrick & Ziegert, 2002). Yet CEL remains rare in economics curricula. A search of the U.S. Campus Compact's syllabi library shows only five economics courses among 379 total listings.[1]

Economics faculty tend to note that the costs of CEL outweigh its benefits (Ziegert & McGoldrick, 2008). CEL projects involve new preparation and can crowd out other course content, while being difficult to assess -- especially if students or community partners do not stay committed (McGoldrick, 1998). In response, this paper presents hackathons as a flexible, modular format that lowers the opportunity costs of CEL while maintaining its educational value. Hackathons can be structured as a one-off 24-72-hour intensive assignment or as the culmination of a multi-week project. They scale easily and adapt to varied instructional goals and student skill levels.

This paper describes how I incorporated hackathons into an advanced undergraduate course, *Data Science for Economists* both as a voluntary and later a mandatory assignment across three semesters. Each of the three iterations had a distinct focus: first, the relationship between streetlight placement and crime, second a cost-benefit analysis of lead paint abatement programs,

[1] The Campus Compact Syllabi Library features syllabi sourced from campuses around the country. The library includes 40 sociology courses, 33 psychology courses, and 22 political science courses.

and third, the design of a randomized controlled trial on rental assistance programs closely linked to my own research. These implementations show how hackathons can function as efficient, high-impact CEL components within the economics curriculum.

CEL coursework can take a variety of forms, but the uniting theme is that students collaborate with community partners for the direct benefit of the school's neighborhood or state. These partners include municipal or state governments, non-profit organizations, civic organizations, or small businesses. The CEL project may be mandatory or voluntary[2] and a small component of the course, like a single volunteering event and reflection assignment, or a large component like a semester-long research project involving weekly volunteer work.

By their nature, hackathons lend themselves most to shorter duration assignments but can be expanded as needed. Hackathons originated as high-intensity challenges, in which small teams work together for 24-72 hours to tackle a single, compact technical problem, or more recently, a social and policy problem (Scott, 2015; Lombard et al., 2024). Hackathons are remarkably flexible in their scope, structure, and evaluation (Rys, 2022). At their core, they are action-oriented, time-bounded, and collaborative. These characteristics overlap with CEL's emphasis on experiential learning and problem-based instruction (Hmelo-Silver, 2004; Warren, 2022).

Hackathons also provide an adaptable way to integrate self-contained CEL projects into any course in line with Ziegert & McGoldrick's (2008) suggestion that CEL can be flexibly integrated into economics coursework. The hackathon format is best used for projects related to data analysis, policy design, survey construction, or program evaluation, aligning it with the evidence-based pedagogical practices that improve equity and learning outcomes in economics

[2] As a substitute for another course assignment or as a bonus towards the final course grade.

coursework, especially for women and students of color (Bartlett, 1996; Bayer & Rouse, 2016). Furthermore, hackathons encourage interdisciplinary thinking, collaborative problem-solving, and stakes, all of which further encourage participation from underrepresented groups (Lombard et al., 2024; Vanhée et al., 2024; Wallwey et al., 2022).

Integrating hackathons into the classroom will also make these competitions more accessible and inclusive. On college campuses, voluntary hackathons are remarkably popular as extracurricular competitions, but technical barriers and unwelcoming communities keep many students from getting these hands-on opportunities (Warner & Guo, 2017). Within a classroom, professors can adjust the hackathon to align with course skill expectations and design hackathon teams to promote inclusive collaboration.

While this paper focuses on data analysis hackathons suited to technical coursework, the format is very adaptable. In other courses, students could design policy proposals, public service announcements, or survey instruments. Alternatively, a course could partner with a community organization to plan an open hackathon on a local issue, teaching students to scope a complex, open-ended economic problem. These alternatives preserve the emphasis on real-world relevance, collaboration, and problem solving of a hackathon, while serving different learning goals.

The rest of this paper is as follows. In the next section, I give an overview of CEL and hackathons and their pedagogical value. In section three, I introduce the classroom setting and three case studies of hackathon applications. In section four, I share results in the form of student-produced materials, student feedback, and a brief reflection. In section five, I offer concluding thoughts.

2. Overview

The OpenBSD Foundation hosted the first hackathon in June 1999 as a competition to troubleshoot and integrate secure IP communications on the internet, also called IPSEC.[3] Given the industry-focused technical origins, hackathons might seem an odd bedfellow with community-engaged learning. In recent years, however, universities, nonprofits, and municipal governments have hosted "social" hackathons aimed at tackling pressing problems with technological solutions (Henderson CEO and Founder, Sandbox Communities, Scott, 2015; Lombard et al., 2024). This community-engaged shift makes even more sense given the pedagogical overlap between hackathons and CEL as forms of both experience- and problem-based learning. By leaning into these similarities, hackathons provide an effective and efficient way to integrate CEL into an economics classroom.

Experience-based learning emphasizes a "use it or lose it" approach to education by giving students real-world opportunities to apply their knowledge shown to increase student learning outcomes (Hansen et al., 2002). Such "use it or lose it" active-learning approaches build economic literacy, problem-solving skills (Hmelo-Silver, 2004). CEL, in particular, increases student learning across a range of disciplines and outcomes including exam scores, cognitive testing, and student surveys (Warren, 2022) including the economics curriculum (Henderson, 2016, 2018; Lopez, 2009). Additionally, these experiential learning courses can help students directly link their education to research practices (Brooks & Schramm, 2007). Furthermore, women and students of color tend to learn better through experience-, and specifically, service-

[3] https://www.openbsd.org/hackathons.html

based pedagogy (Bartlett, 1996), groups that undergraduate economics departments struggle to reach (Bayer & Rouse, 2016; Bayer & Wilcox, 2017).

Despite the advantages, the economics curriculum has been slow to adapt CEL methods due to the lost economic instruction time (Henderson, 2018). In many CEL courses, these experiences tend to come through semester or year-long partnership with community organizations and reflection assignments (McGoldrick, 1998). Hackathons, on the other hand, are intentionally shortened and action-oriented opportunities to apply and stretch classroom content. As such, they provide a way to integrate a high-impact educational practice efficiently and flexibly (Kuh, 2008).

In addition to being more compact and flexible, hackathons provide action-oriented and problem-based learning that requires creative and interdisciplinary problem-solving – a skill which can be hard to elicit from students through textbook problems (Vanhée et al., 2024; Wallwey et al., 2022). These approaches fit neatly into the CEL, which prioritize students having opportunities to grapple with and commit to working on problems without a simple answer (Henderson, 2016; Lara & Lockwood, 2016). Furthermore, as a form of contest-based learning, hackathons can promote innovative thinking and increased opportunities to collaborate (Bullinger et al., 2010).

In this paper, I present an implementation of a hackathon from an advanced undergraduate elective called *Data Science for Economists* that emphasizes practical econometric skills. This model can be easily adapted to fit introductory statistics or econometrics courses, upper-year electives, or graduate seminars. Less technical courses might use a hackathon to design evaluation plans, draft surveys, or propose new public services. Instructors can also scale the format, from a 24-hour sprint to a multi-week project, while preserving the core design principles of time-bounded collaboration, problem solving, and real-world application.

3. Course Setting and Applications

I implemented hackathons in the course *Data Science for Economists*[4]. This upper-year elective requires introductory econometrics and statistics and covers the data wrangling tasks needed to create replicable empirical work using advanced causal inference and introductory machine learning methods. Students learn version control, relational database management, R programming, and the potential outcomes framework for causal inference. Outside of its technical learning goals, the syllabus is otherwise flexible to cover a wide array of topics. While flexibility is not mandatory to implement service learning or run a hackathon, it simplifies implementation.

In this course, students build skills through quick turnaround coding exercises and bi-weekly problem sets. Students are expected to write original code in the R programming language and use GitHub to maintain organized coding repositories that contain the scripts necessary to replicate results from raw data. These assignments teach them to scope the data wrangling process in addition to sharpening their coding and data carpentry skills.

The other major assignment in the course is the 48-hour hackathon, which I have run for three semesters in collaboration with the Lewiston Department of Economic and Community Development (DECD) and the Lewiston Housing Authority (LHA). Held near the end of the semester, the hackathon challenges students to work in teams of 4–5 to address a problem statement co-developed with city partners.

[4] Initially called Big Data and Economics.

The hackathon spans 48 hours—from Tuesday to Thursday between class meetings—but students are not expected to work continuously. Instead, they divide tasks strategically based on each team member's strengths and availability. The event kicks off during Tuesday's class, when students receive the prompt and access to a Github repository with data and starter code. Example repository can be found at https://github.com/big-data-and-economics/lead-hackathon. Presentations are delivered on Thursday to an audience of city officials and the Bates community who provide feedback. Students integrate this feedback into a final two-page write-up of their work turned in with a GitHub repository of the code and data needed to replicate their findings.

To support collaboration, I reserve dedicated campus workspaces equipped with AV technology for the entire period and provide meals using grant funding.[5] These logistics help students prioritize the project while minimizing outside distractions and promote inclusivity by reducing barriers to participation.

In Spring 2024, the hackathon was optional and counted for 10% of the final grade. Students who opted out had that weight added to their final project. Seven of 18 students participated, analyzing the question: *What is the relationship between streetlight placement and crime?* They used address-level streetlight data from the Lewiston DECD and crime reports obtained via FOIA request from the Lewiston Police Department. The crime data arrived as typewritten PDFs, which students digitized during the hackathon before analysis.

In Fall 2024, the hackathon became mandatory, replacing the final project and accounting for 30% of the course grade. Students worked in teams of 4–5 to conduct a cost-benefit analysis of a

[5] The Harward Center for Community-Engaged Learning generously provided $500 in grant funding Winter 2024. In Fall 2024, I received a $3,000 course development grant from the Bonner Foundation which partially funded the food purchases.

lead abatement program aimed at reducing exposure in Lewiston's aging housing stock. They received Census block-level data on child lead poisoning and housing age, address-level program participation records, and literature on the economic and educational costs of lead exposure. Their research questions included: *Are lead abatement grants going to the areas of greatest need?* and *Where should Lewiston prioritize future investments?* The timing aligned with new EPA guidelines released in October 2024, which lowered the allowable lead dust levels after abatement. [6]

In Spring 2025, the hackathon supported my ongoing research partnership with LHA to design a pilot program offering direct cash assistance in lieu of housing vouchers. Students developed a pre-analysis plan and offered recommendations for structuring a randomized controlled trial (RCT). They used de-identified administrative data on voucher recipients to conduct power analyses and assess design tradeoffs.

Throughout all semesters, I collaborated with community partners in advance to define the research questions and secure necessary data. These early conversations were essential, especially when public records, like crime reports, required lead time to acquire. When defined early, hackathon topics could also be woven into course materials and problem sets.

Starting in Fall 2024, I began involving students in this preparatory work. Partners visited class early in the semester to introduce the project, and students submitted written questions and data requests. This model highlights a key strength of the hackathon format: students can engage meaningfully either throughout the semester or solely during the 48-hour event.

[6] See "EPA Strengthens Standards to Protect Children from Exposure to Lead Paint Dust" EPA Press Office, October 24, 2024

During the hackathons, students went well beyond loading clean data or running canned regressions. They digitized crime reports from PDFs, geocoded addresses, and merged in Census data to contextualize economic conditions. They grappled with the gap between ideal and available data, made modeling assumptions, and debated how to draw meaningful inferences from messy or incomplete information—key skills in observational data analysis. Importantly, they also received real-time feedback from city officials, economics faculty, and community members during presentations. These questions—ranging from technical refinements to broader policy relevance—helped students refine their work and recognize the broader impact of their analysis before final submission.

4. Results

Across three semesters, the hackathon model produced tangible outputs: student-written code and reports, original analyses shared with community partners, and skill gains documented in survey feedback. Below, I summarize student work, community impact, and reflections on the learning experience.

4a. Spring 2024: Streetlights and Crime

The Spring 2024 hackathon explored the relationship between streetlight placement and crime in Lewiston. Seven students volunteered to work with address-level streetlight data and two PDFs of crime reports obtained via FOIA request by the Lewiston DECD. The reports were typewritten and unstructured, so students began by digitizing and cleaning the data using R — a skill introduced during the kickoff session.

From there, students mapped the crimes and streetlights as shown in Figure 1 and quickly noticed both were concentrated downtown due to population density. Using spatial joins, they matched each crime to nearby streetlights at multiple distance thresholds and visualized patterns by crime type. Three separate regression specifications visualized in Figure 2, though correlational, suggested that one additional streetlight within 50 meters was associated with five fewer crimes, on average.

In their presentation, students went further: they proposed strategies to identify causal effects, including randomizing installation order and using difference-in-differences to estimate impacts. They also identified specific neighborhoods with high crime and sparse lighting as candidates for intervention. The DECD found the results useful and shared them during an annual budget discussion.

While the students' technical execution was solid, their regression analysis included only locations where crimes were reported, omitting areas with zero incidents. This mistake, pointed out by a faculty member, biased their estimates toward a negative relationship. One student, thinking on their feet, acknowledged the issue and explained how conditioning on reported crimes would affect their interpretation. Separately, a city official asked whether the team had filtered for nighttime crimes — a key distinction since streetlights are only active after dark. These real-time exchanges prompted the group to revisit their assumptions, and they incorporated both pieces of feedback into a final write-up.

The project stretched students beyond what they typically encounter in the classroom. They worked with messy administrative data, tackled geospatial analysis, and responded to live policy feedback — all within a tight timeframe. One student later said presenting to city officials made the stakes of the work feel "very real."

4b. Fall 2024: Lead Abatement Programs

In Fall 2024, students (eight seniors and six juniors) worked in three teams to assess the targeting and cost-effectiveness of Lewiston's voluntary lead paint abatement program. Each team approached the challenge slightly differently, but all were asked to combine administrative data with public data to evaluate where the program was working.

I also built on lessons from the first hackathon. First, I invited the community partner to introduce the project to students several weeks before the hackathon. She invited students to a community meeting about environmental safety in Lewiston. If they attended the meeting and wrote a summary, I awarded bonus points. Second, students submitted data requests and clarifying questions to the community partner as participation assignments during the semester. These changes gave the students some baseline understanding and early investment in the project.

During the hackathon, students received address-level data on program participation and matched it to Census block-level data on poverty and housing age from the American Community Survey, and childhood lead poisoning rates from the Maine Childhood Lead Poisoning Prevent Program (MCLPPP) all via the Maine Tracking Network. They geocoded each property using *tidygeocoder* in R and joined it to demographic and housing data. In doing so, they created maps like Figure 3 showed the overlap (or lack thereof) between where lead poisoning had declined and where the program had been implemented. Each group then tried to model the relationship between lead poisoning, poverty, and housing stock using different regression approaches. One group applied bootstrap regressions, which I covered earlier in the course. Another group focused on quantile patterns, estimating that poisoning rates were highest in homes built between 1890 and 1940 based on a histogram and CDF shown in Figure 4.

For cost-benefit analysis, students had to get creative. While costs were straight-forward, benefits were less concrete. Some pulled estimates from academic literature on the educational losses and wage of from lead exposure to model the benefit of each abatement. One group tried to estimate market effects using changes in home values, pulling property values from Zillow listings to estimate appreciation. While the data wasn't complete, the group built a compelling proof of concept and described how a future analysis could match treated homes to nearby controls.

Students also grappled with real-world data constraints. The MCLPPP top-codes any block group with fewer than five cases of lead poisoning, and HIPAA rules prevent release of household-level health data. This forced students to reason through the data generating process and acknowledge what they couldn't know. One team anticipated a partner's question and showed that their results were stable whether they assumed one or five cases for top-coded areas. Another acknowledged the missing rate of lead in homes and suggested ways to proxy it using housing age.

While the overall work was strong, some groups confused complexity with depth, spending time on technically impressive that muddied their findings. One group, for example, built an interactive heatmap of lead poisoning rates that visually implied household-level precision, despite the data being available only at the block-group level. Another used bootstrapping, an approach to estimate uncertainty with limited data that I covered in class, to model the relationship between poverty and lead poisoning. Their results closely matched a simpler OLS regression, but the added statistical detail made the conclusions harder to interpret. In grading, I highlighted these as opportunities to reflect on the tradeoff between transparency and technical precision.

These tradeoffs between precision, transparency, and data availability are core to applied policy analysis. Students had to prioritize clarity over comprehensiveness, building models that made the best use of limited data while remaining aware of its limitations. Several commented that the experience helped them see why transparency and assumption-checking matter in real-world research.

4c. Spring 2025: Direct Rental Assistance Pilot

The Spring 2025 hackathon had a more academic focus. Rather than analyzing a preexisting policy, students were tasked with designing a randomized controlled trial to evaluate a pilot program offering direct rental assistance instead of traditional housing vouchers. The program is part of my own research agenda in partnership with the Lewiston Housing Authority (LHA) and Housing and Urban Development (HUD).

Ten sophomores and two seniors worked in three teams to develop pre-analysis plans, recommend rollout strategies, and conduct power analyses using de-identified administrative data on current voucher recipients. The hackathon took place two weeks before the end of the semester, giving students extra time afterward to refine their work.

In their presentations, students highlighted that the proposed sample size might be too small to detect meaningful effects. Figure 5 shows one of the power analyses, showing the sample must be at least 1700 observations to get 80 percent power with an effect size of $400. Their power calculations led our research team to revise our proposal to HUD, expanding the sample from 300 households to 2000 households by adapting the study to compare against current housing voucher recipients.

Teams also drafted hypotheses about how direct rental assistance might affect rent burden, mobility, and discretionary spending. These hypotheses combined economic theory and practical policy questions. One group emphasized the need to pair the program with budgeting or negotiation support, suggesting it might improve outcomes beyond cash transfers alone. The LHA representative noted these suggestions for potential future phases of the program.

Despite these strong contributions, there were growing pains. Some teams misunderstood what their power analyses measured—confusing Cohen's D (a standardized effect size) with a percentage difference in outcomes. Others relied heavily on econometric jargon that obscured their points for non-technical stakeholders. Still, the extra time after the hackathon gave students space to revise and clarify. The group that mixed up Cohen's D changed to a power analysis by simulating a difference-in-difference model as shown in Figure 6, which matched their analysis plan. One group added an entirely new analysis; others rewrote their reports to make the work more accessible.

This case showed the value of pairing a tight, time-bound hackathon with follow-up opportunities for reflection. It also gave students a rare chance to influence an actual research study before it began. Furthermore, as the project moves forward, these students will make fantastic research assistants given their familiarity and technical expertise with the project.

5. Student feedback

In addition to evaluating the outputs students produced, I reviewed student feedback gathered by the Harward Center for Community Engagement at Bates College on the last day of class. Because the hackathon was the central component of community-engaged learning (CEL) in the course, I interpret student responses as evaluations of that experience. Response rates were high: 17 out of 18 in Spring 2024 (voluntary), 11 out of 14 in Fall 2024 (mandatory), and 12 out of 12 in Spring 2025 (mandatory). While sample sizes are modest because class sizes are small, the consistency of responses over time suggests the results are representative of students in a liberal arts economics course.

In surveys, students indicated that they developed a variety of technical, conceptual, and interpersonal skills. Figure 7 shows which skills students developed. Across semesters, more than 75 percent of students cited “collaboration or teamwork” as a key takeaway, followed by “problem solving,” “organization and time management,” “critical thinking,” and “creativity.” These skills map closely onto the hackathon’s structure: an intense, time-limited project that requires students to work in teams to solve an open-ended empirical problem.

Additionally, students valued the service component of the hackathon. Figure 8 presents student responses to six Likert-scale questions about the community-engaged aspects of the course. Across semesters, students overwhelmingly agreed that the experience enhanced both their own learning and helped of the community. Between 65 and 90 percent of students per semester agreed or strongly agreed that CEL increased their investment in the course, deepened their understanding of core concepts, and helped them grow personally and professionally. Across semesters, more than 70 percent agreed that the work directly benefited the community.

Community partners confirmed this benefit. The DECD shared results from the Spring 2024 streetlight hackathon with the Lewiston city council ahead of a budget meeting. The partner from Healthy Androscoggin said the Fall 2024 groups “filled her heart with joy” and highlighted their work during a community meeting. In Spring 2025, students’ feedback on a proposed rental assistance trial directly shaped our research design and helped justify a revision to increase statistical power.

While overall student feedback was positive, enthusiasm dropped off slightly after Spring 2024, when participation was voluntary. In later semesters, some students expressed more ambivalence about a mandatory hackathon. Figure 9 compares responses from the full Spring 2024 class to the seven students who opted in that semester. The volunteers reported greater satisfaction across all dimensions. This gap suggests that making participation mandatory may affect student engagement, particularly in courses where students expect consistent, methodical training in coding and data analysis.

At the same time, making the hackathon optional raises equity concerns. Some otherwise enthusiastic students may opt out because they fear the commitment is incompatible with other responsibilities. In Spring 2024, for example, one non-participant said the timing made the hackathon feel unmanageable with clubs, sports, and other coursework. To address this, I made several adjustments in later semesters. I invited students to help schedule the event, provided regular reminders, emphasized collaboration through earlier group problem sets, and clearly framed the hackathon's goals and structure. These changes helped make the experience more accessible and rewarding for a broader group of students even if the format remained time intensive.

Students consistently flagged time pressure as their biggest challenge. Several said that 48 hours is too compressed and suggested expanding the project to one or multiple weeks with opportunities for more community feedback. These critiques are valid, but the time constraint is an intentional feature, not a bug. To succeed, students must make informed decisions about how to allocate their effort, divide tasks, and prioritize analysis under real-world constraints, which is often missing in traditional coursework. I do not expect students to work for 48 hours straight, but the sprint format encourages focused collaboration. Also, a short duration respects community partners' time and makes them more likely to participate. With clear expectations and built-in flexibility, the hackathon can remain both rigorous and realistic.

Still, when students become genuinely invested in their work, a sharp cutoff can feel abrupt or frustrating. As one student put it, the experience left them wanting to "push the analysis further." To address this, I offer three strategies:

1. Invite community partners to suggest follow-up opportunities, such as internships or volunteer projects.
2. Include a brief post-hackathon assignment, like a summary report or poster, that lets students revise and communicate their final thoughts to the community members.
3. Use the hackathon as a kickoff to a larger unit or semester-long project. Starting with an intensive sprint can build momentum and deeper engagement over time.

Taken together, the feedback from students and partners affirms the academic, personal, and professional value of the hackathon model. While not without tradeoffs, the model offers a high-impact, scalable way to integrate community-engaged learning into economics education.

6. Conclusion

In this paper, I presented a series of data-focused hackathons implemented in an advanced undergraduate economics course as a form of CEL. Students worked intensively over a short period to analyze real-world data and deliver findings to local government and nonprofit partners.

A hackathon provides a compact, high-impact way to integrate CEL into an economics course. While the quick turnaround means that students make mistakes or cut corners, they largely delivered meaningful work under real constraints. Many reported that the experience gave purpose to their technical learning and created authentic stakes for their work. Interestingly, this same “quick turnaround” format was also the source of the most criticism. Several students felt that compressing CEL into a brief window left them wanting more time to reflect, revise, or deepen their analysis, underscoring their investment in the project.

In addition to its compactness, a hackathon is highly flexible. Instructors can scale it from a two-day sprint to a multi-week project, use it as a standalone event or as a capstone, and adapt it to a wide range of course goals. This flexibility helps contain the opportunity costs of CEL without sacrificing student engagement, collaboration, or relevance. While not without costs on instructor time, hackathons provide a structure that is both scalable and meaningful, especially for economics courses seeking to connect theory, data, and the real world.

Figures

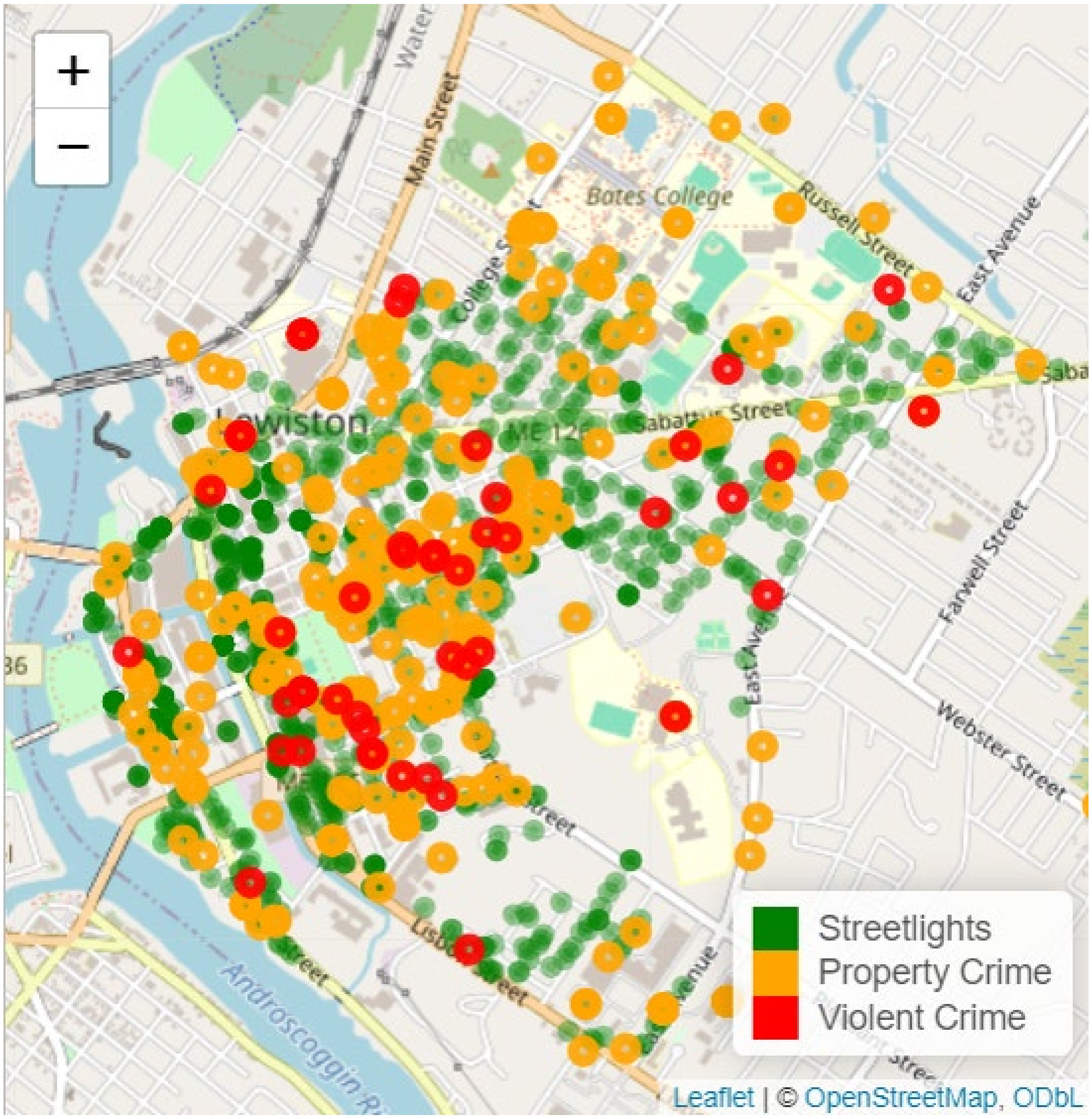


Figure 1: Map of street light locations, property crime, and violent crime in the City of Lewiston. Data provided by the City of Lewiston and map produced by students.

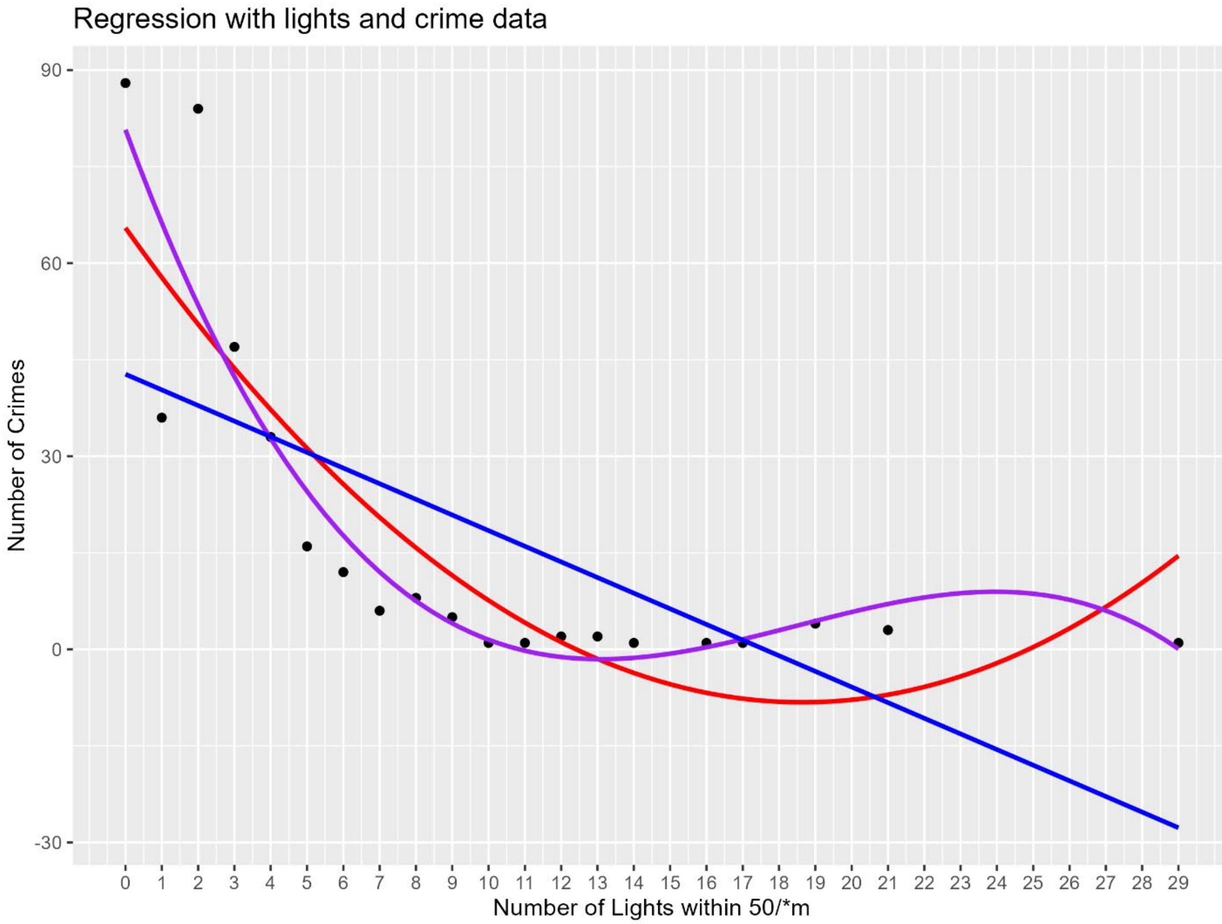


Figure 2: Average crimes by the number of streetlights with various linear model fits. Data provided by the City of Lewiston. Analysis and graph produced by students.

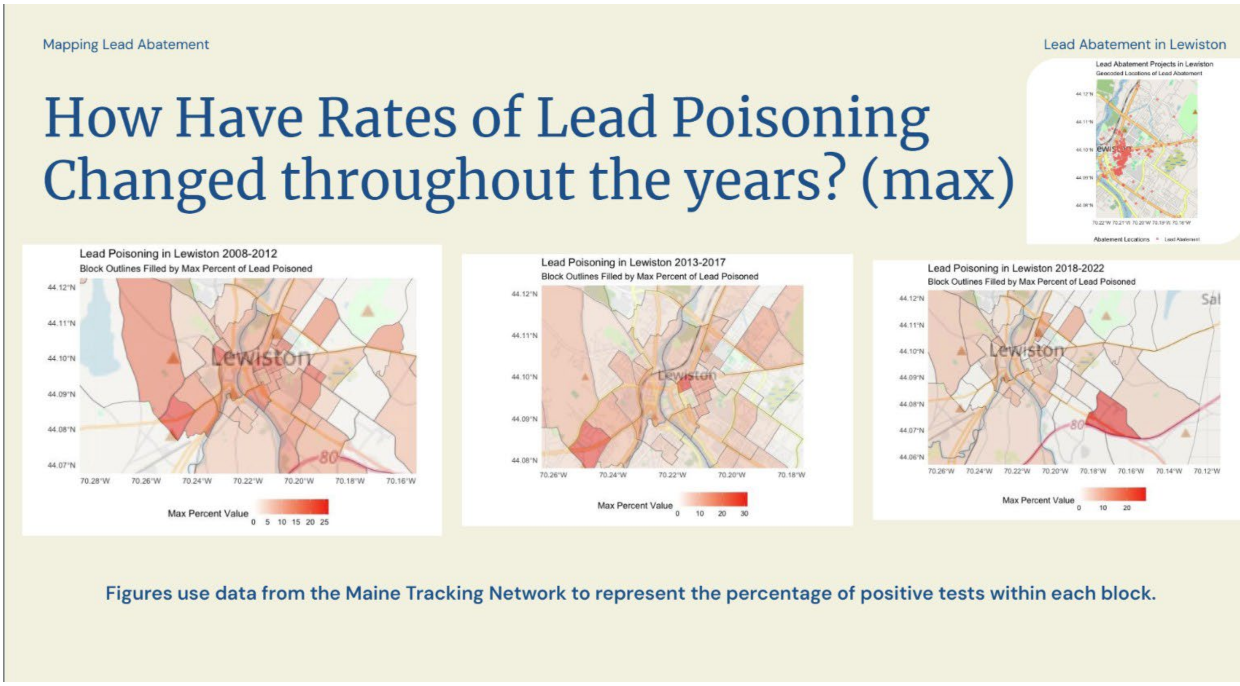
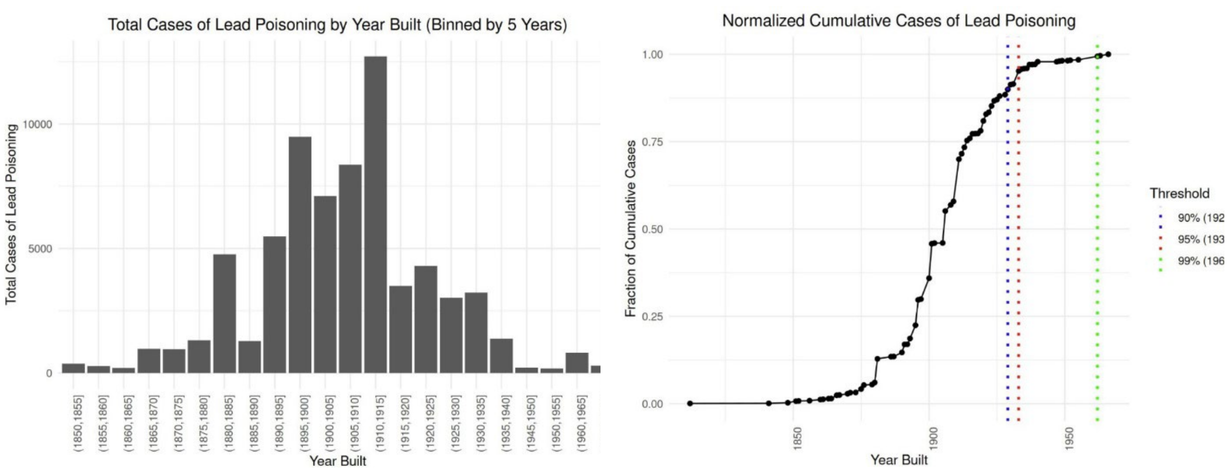


Figure 3: A slide pulled from a student presentation depicting spatial heatmaps of the lead poisoning rates in Lewiston from 2008 to 2022 at the Census Block level using the top-coded value of five cases in areas with zero to five cases. Top coding protects identities per HIPAA restrictions. Original data came from the Maine Childhood Lead Poisoning Prevention Program by way of the Maine Tracking Network. The map in the upper-right corner shows the locations of households that participated in the Lewiston Lead Abatement program provided by the City of Lewiston. All maps produced by a student group.



(a) ***(b)***

Figure 4: These figures show the total cases of lead poisoning from 2008 to 2022 by census block group in Lewiston, Maine by the average year that housing was built in that census block group. Figure (a) shows a histogram of the counts of lead poisoning cases binned by year of construction. Figure (b) shows the corresponding cumulative density function. The data on lead

poisoning cases came from the Maine Childhood Lead Poisoning Prevent Program and the data on year of housing construction come from the City of Lewiston Property assessment data.

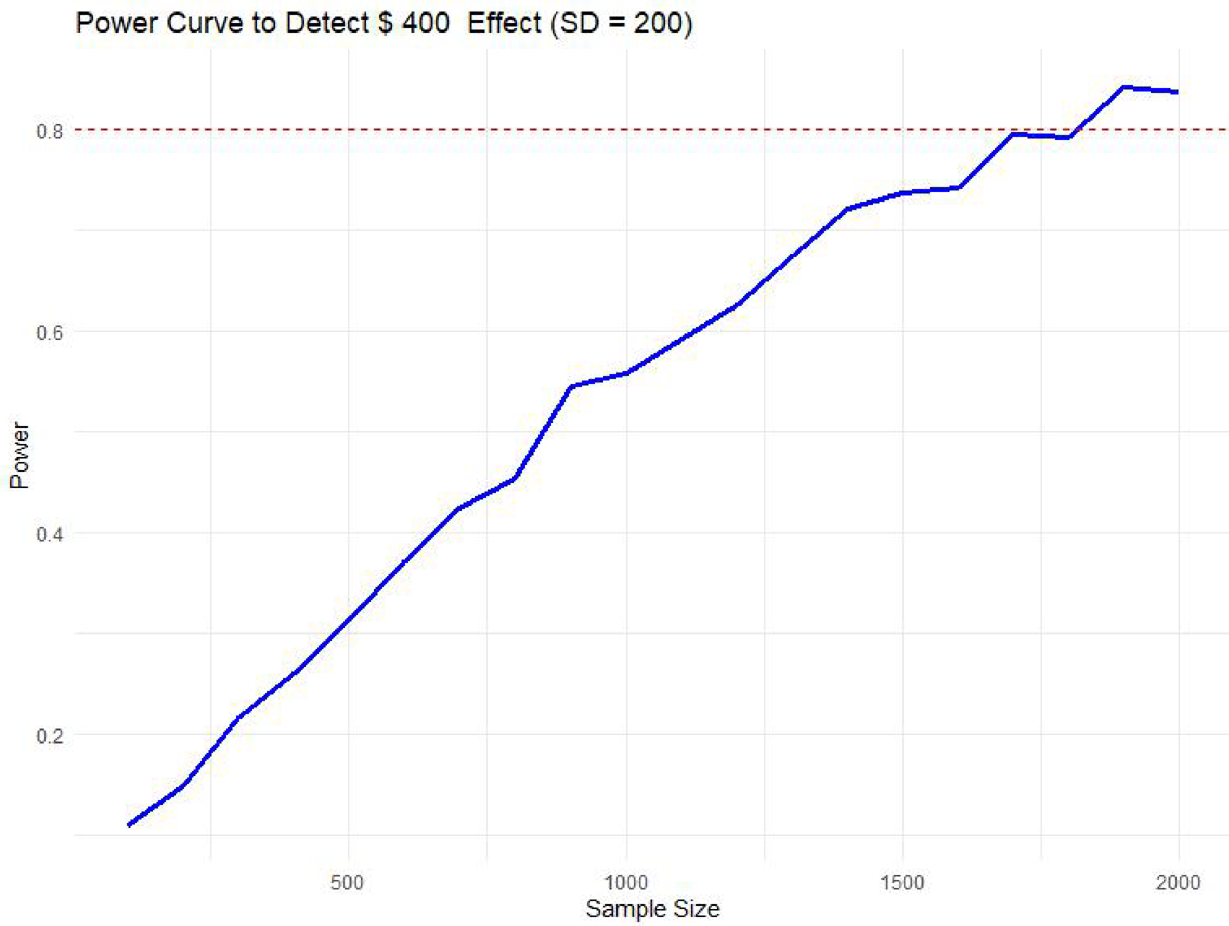
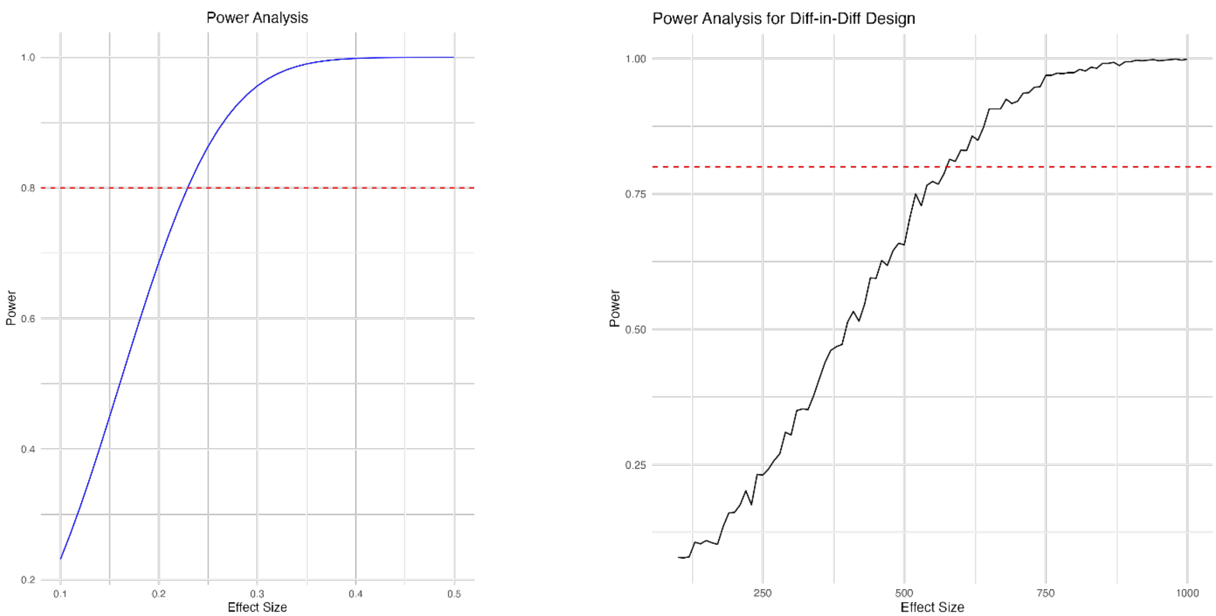


Figure 5: A power curve calculated by one of the groups in the Winter 2025 hackathon. The calculations were performed by simulating a difference-in-difference model of the effect of direct rental assistance on out-of-pocket rental payments. The graph shows the share of trials that meet a five percent significance threshold for a given sample size when estimating a $400 effect size with a standard deviation of $200. The standard deviation was based on student calculations from administrative data on local rents. The group simulated 1000 samples for each sample size.



(a) ***(b)***

Figure 6: Above shows two power analyses by the same group of the minimum effect size of a change in rent for direct rental assistance recipients. Figure (a) is based on repeated calculations of a two-way t-test using the function from the *pwr* package in R and shows Cohen's D, the effect measured in standard deviations on the x-axis and the statistical power on the y-axis. Figure (b) shows a power analysis done via simulation of a difference-in-differences model after initial feedback during and after their presentation that the analysis in figure (a) did not align with their assumptions. The students assumed a sample size of 300 and a standard deviation of \$1250 and initial baseline average rent of \$1650 all pulled from underlying administrative data on local rents. The group simulated 1000 samples for each effect size.

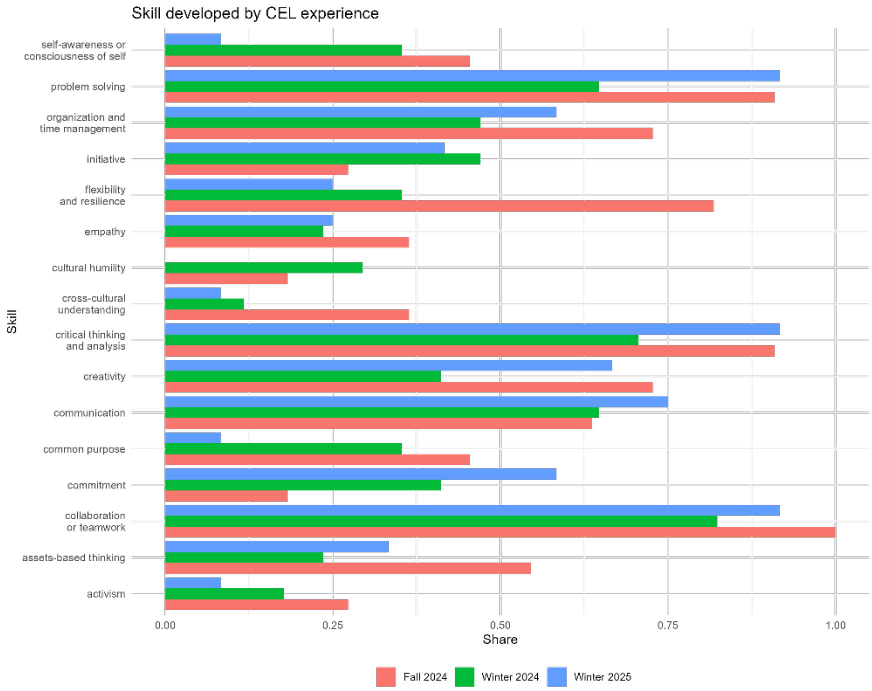


Figure 7: The share of students each semester indicating that they further developed the skill along the y-axis. Survey responses were collected on the last day of class and compiled by the Harward Center at Bates College. Figures produced by the author.

Figure 8: Share of students in each semester stating their level of agreement with the statement "The community-engaged aspects of this course" followed by the text in each subplot. Survey responses were collected on the last day of class and compiled by the Harward Center at Bates College. Figures produced by the author.

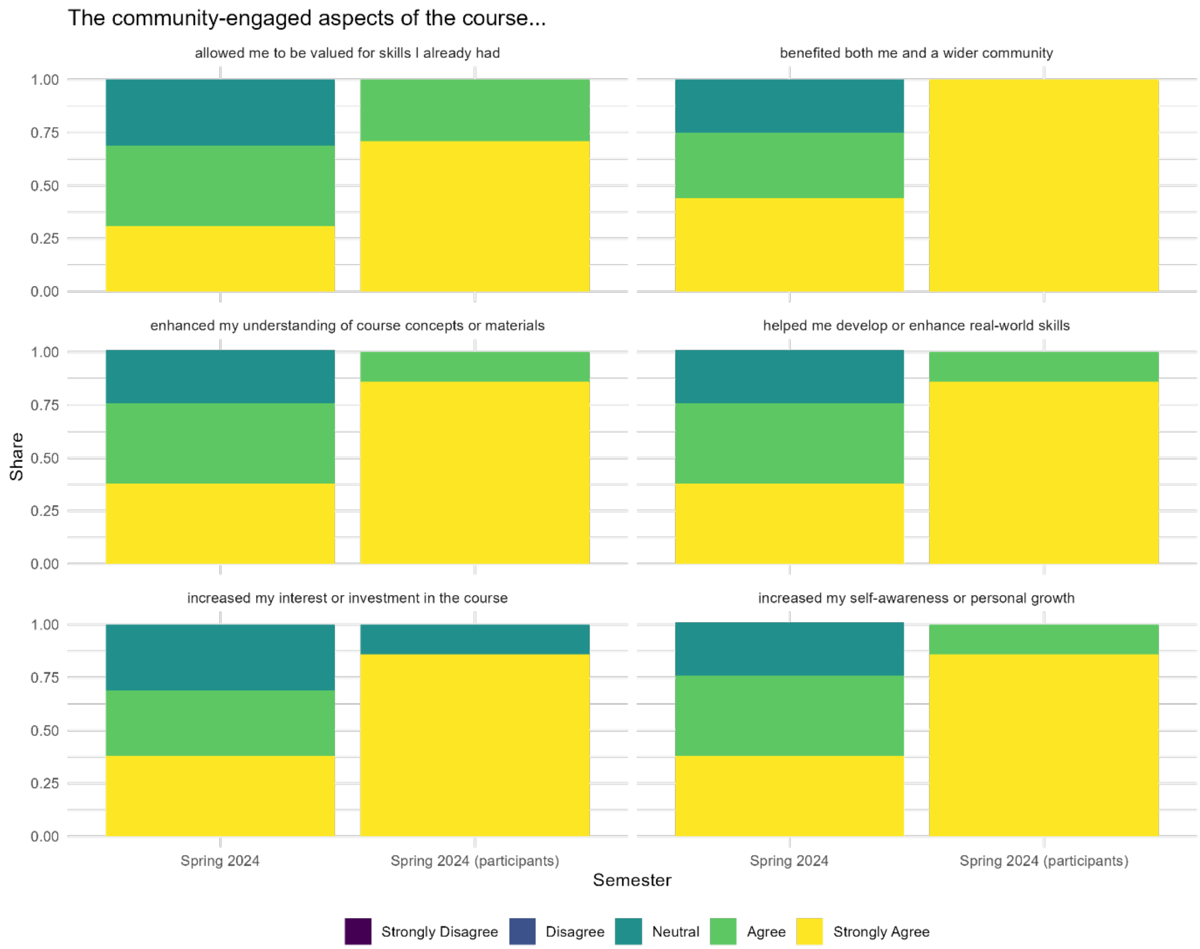


Figure 9: Share of students in the Spring 2024 overall and among volunteer participants stating their level of agreement with the statement "The community-engaged aspects of this course" followed by the text in each subplot. Survey responses were collected on the last day of class and compiled by the Harward Center at Bates College. Figures produced by the author.