Expanding Access to Global Learning for Engineering Students Through an Interdisciplinary Sustainability Program

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Introduction

Engineering education in the United States faces a persistent tension: while educators increasingly recognize the importance of global competence and interdisciplinary thinking, the structure of many engineering curricula makes it difficult for students to pursue international experiences (National Academies of Sciences, Engineering, and Medicine, 2012; Jesiek et al., 2012). Tightly sequenced courses, heavy prerequisite requirements, and the perception that time away from campus delays progress toward degree completion create significant barriers to studying abroad (Warnick et al., 2018). For engineering students at institutions where the discipline operates as a separate school or college, these obstacles are often compounded by limited flexibility and integration with other academic areas. The result is that many engineering students graduate without the global perspective and cross-cultural competencies that employers and professional organizations identify as essential to addressing complex, worldwide challenges (Hart Research Associates, 2015; World Economic Forum, 2023).

At Dartmouth College, where the Thayer School of Engineering is uniquely integrated into the liberal arts curriculum, we recognized an opportunity to reimagine how engineering students engage with the world. Rather than viewing study abroad as an obstacle to degree progress, we asked: How might we design an international experience that strengthens both technical expertise and global citizenship while honoring the integrity of the engineering curriculum? This question led to the creation of the Green City Foreign Study Program (FSP), a joint initiative between Thayer and the Department of German Studies designed specifically for engineering students. Now in its third iteration after two successful runs, the program demonstrates that meaningful international and cultural learning is possible when deliberately integrated into disciplinary coursework rather than positioned as separate from it.

The Green City FSP invites students to explore sustainability and sustainable urban systems through a technical and cultural double-lens. Based in Berlin – a global leader in urban sustainability – students combine rigorous engineering coursework on environmental systems and sustainable cities with either intensive German language study or coursework on German history and culture taught in English. Through homestays, excursions, and co-curricular activities, participants connect engineering principles to lived experiences of sustainable design and environmental practices, experiencing sustainability as simultaneously a technical challenge and a social, linguistic, and cultural concept.

This paper examines the program's design, implementation, and impact. Drawing on quantitative and qualitative analysis of an initial interest survey (Survey A), student program evaluations

(Survey B), and a newly developed program alumni survey (Survey C), we present evidence that the program achieves transformative learning outcomes while maintaining academic rigor. We also identify the limitations of current capacity relative to student demand. By sharing both the model and evidence of its effectiveness, we contribute to broader conversations on how international and experiential learning can be meaningfully embedded in engineering curricula to develop graduates who are technically skilled, globally aware, interculturally competent, and committed to using engineering to address some of humanity's most pressing challenges.

Background and Motivation

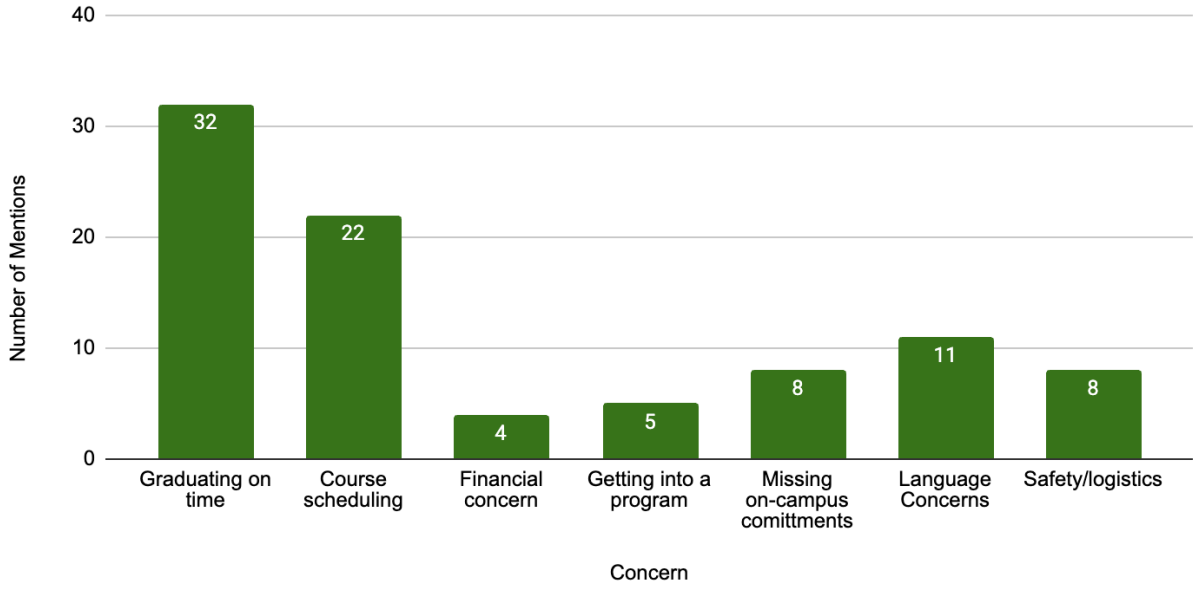
Interest at Thayer

In recent years, the Thayer school has seen strong demand for study-abroad opportunities, but prior to the launch of the Green City program, students' options were limited to a small number of traditional exchange programs. Applicants for these programs have typically outnumbered available positions by roughly three to one (the most recent application cycle corroborates this trend; in the 2024-2025 academic year, 38 students submitted applications to Thayer's four exchange programs, which together offer only 11 available spots). Over the past five years, Thayer has graduated an average of 110 AB engineering students annually, while offering an average of just 11.25 exchange spots per year.

Administrators, faculty, and students were keenly aware of the imbalance between supply and demand. It was much less clear, however, exactly what kind of new program would cater best to students' international interests and curricular needs. As the first step in the development of the Green City program, a faculty member from the Thayer School of Engineering, a faculty member from the Department of German Studies, and a rising senior engineering student therefore designed a detailed initial-interest survey (Survey A) and administered it in July 2019 to approximately 440 engineering undergraduates, 103 of which provided responses (roughly 23% of those contacted). While the respondents may reflect some self-selection, potentially overrepresenting students already inclined toward international experiences, the results nevertheless substantiated what was anecdotally already well known: that interest in study-abroad opportunities ran high. Among respondents, 88.4% indicated interest in studying abroad, with 74.8% selecting "strongly agree" and an additional 13.6% selecting "somewhat agree."

The survey also asked students how many engineering courses would need to be offered as part of a study abroad program for them to consider participating. Among the 103 respondents, 59.2% indicated that they would require at least two engineering courses, 25.2% preferred three engineering courses, and 15.5% indicated that at least one engineering course would be sufficient. When asked about hesitations related to participating in an engineering study abroad program, more than half of respondents expressed concern about their ability to complete degree requirements on time as well as the structural mismatch between academic calendars: Dartmouth operates on a 10-week term system, while many international partner universities follow semester-based schedules. As a result, exchange programs often require a two-term commitment abroad to align with a single academic term at the host institution, creating significant challenges for engineering students attempting to remain on track for timely degree completion.

Figure 1: Survey A, Most Common Hesitations to Study Abroad (n=62)



In direct response to the survey findings, which revealed strong student interest in study abroad alongside structural barriers within traditional exchange models, the Thayer School of Engineering and the Department of German Studies jointly developed the Green City Foreign Study Program to better align international experiences with engineering degree requirements. The program currently runs every other year. Since its launch in the spring of 2022, it has experienced a marked increase in student interest. In the inaugural 2022 offering, 19 students applied and 17 participated. By 2024, applications increased to 30 for 20 available spots, and for the 2026 iteration, the program received 50 applications for the available 20 spots. Overall, the number of applications grew by more than 160% over the program's first four years, indicating rapidly growing demand and sustained student enthusiasm for the program.

The Faculty-Led Model

The Berlin "Green City" study abroad program is a 10 week, quarter long faculty-led program. To situate this program amongst similar programs of international engineering education, we compare this model with other popular study abroad formats. "Study abroad" can describe experiences that range from traditional exchange programs, semester and year long abroad programs, and short term study abroad programs. Engle and Engle elucidate the characteristics that can be used to classify the wide variety of programs that fall under the "study abroad" umbrella. Key characteristics include the length of the trip, entry target language competence, language used in coursework, context of academic work, types of student housing, provisions for guided/structured cultural interaction and experiential learning, and guided reflection on cultural experience (Engle and Engle, 2003).

While many study abroad programs take the form of an exchange, in which students enroll for a semester or longer in a host university, the "Green City" program instead brings Dartmouth to Germany. In important ways, it therefore resembles the "exported campus" or "island" model of study abroad education, in which students and faculty from a single institution form a "self contained community within the host culture" (Goldstein, 2015). Programs such as the Georgia Tech-Europe campus in France fit this description in an engineering context, where students are taught by Georgia Tech faculty on programs ranging from a semester to a year (Georgia Tech-Europe, 2026). Cornell's "Global Start Cantabria" is another example of an engineering cohort program, yet in this example students take classes taught by Universidad de Cantabria faculty. Students live with a host family for a two week language immersion program, and then move into dorms for the remainder of the program (Global Start Cantabria, 2025). Other universities provide short term study abroad experiences during school breaks or embedded into existing course offerings. Goldstein notes that the "island model" offers many advantages, such as "(1) greater accessibility to study abroad for students with limited language proficiency or cross-cultural experience, (2) pre-approved curricula that are consistent with the home institution's academic requirements, (3) programs scheduled to fit the duration and timing of the home campus term, (4) the potential for including innovative experiential courses tailored to the needs and interests of study abroad participants, (5) a group context that facilitates own-culture learning [...], (6) tuition and fees that are kept within the institution, rather than paid to outside entities, and (7) an easily accessible mechanism for faculty development" (Goldstein, 2015). Island programs, however, frequently also draw criticisms, most notably that they lack social and cultural integration and isolate participants from locals of the host country (for a thorough discussion of these criticisms, see Hanouille and Luener 2001).

"Green City" can be best described as following the "island" model, but with some crucial modifications. It retains key advantages of the island model while redressing its disadvantages through the use of the homestay format, prerequisite German language education, the full-immersion approach to language learning, and numerous cultural excursions during the program that bring participants into dialogue with locals. "Green City" thus provides students with the opportunity to engage thoroughly with the German language, culture, engineering knowledge, and practices of sustainable living, while providing ample support in the transition to living abroad. To stay with the metaphor of the island, "Green City" participants live "off the island" whenever they are not in class, but they come together "on the island" for coursework, reflection meetings, and group activities. In this way, the program provides what Hanouille and Luener describe as a "safety net" for students less comfortable with direct integration, yet without compromising students' ability to experience local life and culture with a significantly higher degree of independence than would be the case in a pure "island" program.

Table 1: Key Operational Distinctions: Faculty-Led vs. Exchange Programs

Factor	Faculty-Led	Exchange
Who Teaches	Home faculty (travels abroad)	Host-university faculty
Credit Type	Direct home credit	Transfer credit (subject to approval)
Pre-approval Burden	Minimal (curriculum is faculty-designed)	Moderate-to-high (syllabi review required)
Student Choice	Cohort travels together; faculty selects sites	Student selects host; individual enrollment
Tuition	Home tuition; aid usually continues	Home tuition or host fees (program-dependent)
Schedule Flexibility	Tightly structured (cohort based)	More flexible (individual timing)
Engineering Fit	Excellent (avoids prerequisite delays)	Good (but requires careful sequencing)

Green City Program Description

Overview

The learning objectives of the "Green City" program are threefold: (1) to impart concretely applicable skills in sustainable and environmental engineering to students; (2) to increase students' German language competency and strengthen their understanding of German history and culture; (3) to enable students to think about how their day-to-day experiences with sustainable living and their engineering knowledge are mediated by a foreign language and different cultural context. In this way, students gain an expansive, historically rich, and culturally reflected understanding of sustainability that goes far beyond what can be learned in a traditional classroom.

Academics: Prerequisites, Course Content, and Course Credits

The Green City program offers a flexible yet structured academic model in which students select any three courses from four course offerings, spanning engineering and German studies. Two technical engineering courses, "Introduction to Environmental Engineering" and "Sustainable Urban Systems," are complemented by two German language and culture courses, "Fast-Track German in Berlin" and "Metropolis Berlin." This structure allows students to tailor their academic experience while ensuring sustained engagement across disciplinary perspectives.

Prerequisites for the different courses are generally light (see Table 2). On the engineering side, general chemistry and calculus are the required prerequisites for “Introduction to Environmental Engineering,” whereas “Sustainable Urban Systems” additionally requires an introductory physics class. These prerequisites are typically completed midway through students’ sophomore year, making participation in the Green City program feasible for students in the second or third year of their undergraduate engineering education without introducing an additional curricular burden. Students from all disciplines within engineering and related departments who complete these prerequisites are able to participate in the program.

On the German side, the courses do not carry any additional prerequisites other than what is required for every program participant: completion of Beginning German with a grade of at least B- (or comparable AP credit) prior to the program term. This requirement ensures that all students will be able to do such basic things as greet their homestay families, ask directions, and order food.

In the engineering courses, students develop theoretical foundations and applied skills related to sustainable design, environmental engineering, pollution prevention and remediation, alternative energy, green engineering, and sustainable cities. For example, in “Introduction to Environmental Engineering,” students select and investigate a location in Germany, where they analyze and visualize air quality data and formulate a research question grounded in local environmental conditions. Similarly, “Sustainable Urban Systems” emphasizes systems-level thinking, with students learning to document and quantify the ways in which a major metropolitan area depends on, and alters, surrounding natural ecosystems.

In the German courses, students acquire linguistic skills and intercultural competencies to communicate effectively in German, to analyze a wide range of literary and historical source materials, and to understand the historical and contemporary significance of Berlin as Germany’s capital and cultural center. For instance, in “Fast-Track German in Berlin,” students learn how to give reasons for their opinions and actions and how to describe events in the past, present, and future orally and in short creative writing assignments. The course builds on the prerequisite language class and combines the two final courses of Dartmouth’s standard three-course foundational language sequence into one. It thus allows students to fulfill their language requirement in an expedited manner. It is fully taught in German and maintains a full-immersion environment. “Metropolis Berlin,” by contrast, is taught in English. In this seminar-style course, students learn how to interpret different representations of Berlin in literature, architecture, and art as reflections of historical change. Advanced German students have the opportunity to augment the course with an optional German language component for German minor credit.

A key differentiator and advantage of this faculty-led study abroad model is that all offered courses are pre-approved by Dartmouth's registrar. Two of the courses are taught by the faculty program directors themselves and the other two by Dartmouth-vetted local faculty. Each course appears in the official course catalog and counts fully toward degree requirements, ensuring that participation in the program supports timely progress toward graduation. This eases the significant anxiety of falling behind that many engineering students experience.

Table 2: Prerequisites for courses offered on the program

Course Title	Disciplinary Focus	Key Requirements/Prerequisites
Intro to Environmental Engineering	Engineering	**General Chemistry**, **Calculus**
Sustainable Urban Systems	Engineering	**Introduction to Environmental Engineering** (prior or concurrent), **Introductory Physics**
Fast-Track German in Berlin	Language	**Introductory German** (A-recommended)
Metropolis Berlin	Culture/History (with option to add advanced language component)	**None** (intermediate German for advanced language component)

Homestay, Excursions and Cultural Activities

For several reasons, the ideal location for "Green City" is Berlin. It is not only the capital of Germany and one of the most fascinating places to study German history and culture, featuring unique cultural offerings as well as a thriving literature, film, and art scene, but it is also considered to be one of the most sustainable cities globally (*Berlin's Rise to the Top 5 of the World's Most Sustainable Cities*, 2024). Green living deeply permeates everyday life in the city. Berliners enjoy a fantastic public transport system and abundant green spaces; they pursue energy-efficient housing experiments; they cycle rather than drive; they share cars, cabs, and moving vans; they recycle (consumers can get back €0.25 for every plastic bottle recycled) (*Deposit Return Scheme in Germany: The World's Highest-Performing Drink Container Recycling System*, 2023); they dress in vintage clothes; and they grow their own vegetables in urban garden allotments, to name but a few everyday activities. New ways to improve the city's sustainability are constantly explored. Moreover, Dartmouth maintains a partnership with Freie Universität Berlin. Through this partnership, program participants receive a Freie Universität ID card, granting them full access to university facilities such as the dining halls and student activities. While it is up to participants how frequently they use Freie Universität dining halls or participate in campus activities, the ID card provides a valuable resource for students seeking deeper integration with their German-speaking peers.

A key part of the program is the experience of living with a local homestay family. Students have the opportunity to practice speaking German and learn from homestay families about local culture, including sustainable living practices common in Berlin such as sorting trash and hanging up laundry to dry. Homestay families take their guests' varying language learning goals into consideration and adapt how they communicate with their guests accordingly. Students participating in "Fast-Track German" are placed with families that will maintain the full-immersion environment as much as possible. Students that are not participating in the intensive language course live with families that switch back and forth between German and English more liberally.

Research Design and Methods

Study Design

This study employs a mixed-methods, descriptive research design to examine student interest in, experiences with, and longer-term impacts of a faculty-led, interdisciplinary engineering study abroad program. Data was collected at multiple points in the program lifecycle using three survey instruments administered to different populations. Together, these instruments provide both cross-sectional and longitudinal perspectives on student motivations, perceived barriers, and learning outcomes.

Data Sources and Participants

Data for this analysis is drawn from three surveys: an initial interest survey administered prior to program development (Survey A), post-program evaluation surveys completed immediately following participation (Survey B), and a newly developed alumni survey designed to capture longer-term impacts (Survey C).

Survey A was distributed in July 2019 to undergraduate engineering students across the Thayer School of Engineering, primarily through introductory and intermediate-level engineering courses. The survey yielded 103 responses from an estimated population of approximately 440 students, providing insight into baseline interest in engineering-focused study abroad opportunities as well as perceived structural barriers.

Survey B consisted of two identical post-program reflection surveys administered by the Guarini Institute at Dartmouth at the conclusion of the 2022 and 2024 Green City program iterations, respectively. Response rates were high for both cohorts, with 15 of 17 participants responding in 2022 (88%) and 18 of 20 responding in 2024 (90%), supporting the use of this data for cohort-level program evaluation.

Survey C was developed to examine longer-term personal, academic, and professional impacts of program participation. The survey was distributed via email to all program alumni from the 2022 and 2024 cohorts and completed anonymously. A total of 24 alumni responded (7 from 2022 and 17 from 2024), corresponding to an overall response rate of 65%. The response distribution reflects a greater representation of the more recent cohort.

Table 3: Data Sources and Participants

Survey	Distribution Year(s)	Survey Population	Response Rate	Distribution Channel
Survey A (Initial Interest)	2019	Thayer engineering undergraduates	103 responses (23% of 440 students contacted)	Email distribution in introductory and intermediate engineering courses
Survey B (Program Evaluation)	2022, 2024	Green City program participants	88% (2022); 90% (2024)	Administered via email immediately following program completion
Survey C (Alumni / Longitudinal)	2025	Green City program alumni (2022 & 2024 cohorts)	65% overall	Email invitation to anonymous online survey

Data Analysis and Limitations

Survey instruments included a combination of Likert-scale items and open-ended response questions. Quantitative data was analyzed using descriptive statistics to identify patterns in student interest, perceived barriers, and reported outcomes. Qualitative responses were reviewed using thematic analysis to identify recurring themes related to motivation, learning, and impact. To quantify themes present in open-ended responses, two student research assistants independently identified themes according to pre-set definitions (see Appendix). After independent review, the students discussed any differences in coding to come to a consensus view. In their initial pass through, the students agreed on 91% of theme assignments.

To protect participant privacy given the small cohort sizes, all responses were anonymized prior to analysis, and identifiable details in open-ended responses were redacted.

Several limitations should be noted. Survey A relied on voluntary participation and may overrepresent students already inclined toward international or experiential learning. Survey C reflects differential response rates across cohorts, with greater representation from the 2024 cohort. As a result, findings should be interpreted as indicative rather than generalizable, and are intended to support program evaluation and design insights rather than causal claims.

Findings and Outcomes

The analysis of the survey data shows the program to be highly effective. The first two iterations clearly met student expectations, had a strong, immediate impact on course choices and career interests, and led to significant post-program growth and the broadening of students' professional perspectives.

Students participating in Survey B were overwhelmingly positive about their experience on the program. All but one respondent from the 2022 cohort reported that they would recommend the program to other students, and 100% of respondents from the 2024 cohort agreed they would

recommend the program. The one respondent who disagreed noted that they wished there had been more hands-on engineering work, and that the courses for the program had had more direct ties to Berlin. In addition, 74% of respondents to Survey B indicated that they could not have "learned just as much by taking the same courses at Dartmouth." Roughly 97% of respondents agreed that they "actively explored the program location(s), expanding [their] knowledge of the area."

Figure 2: Survey B, 2022 Likert Results

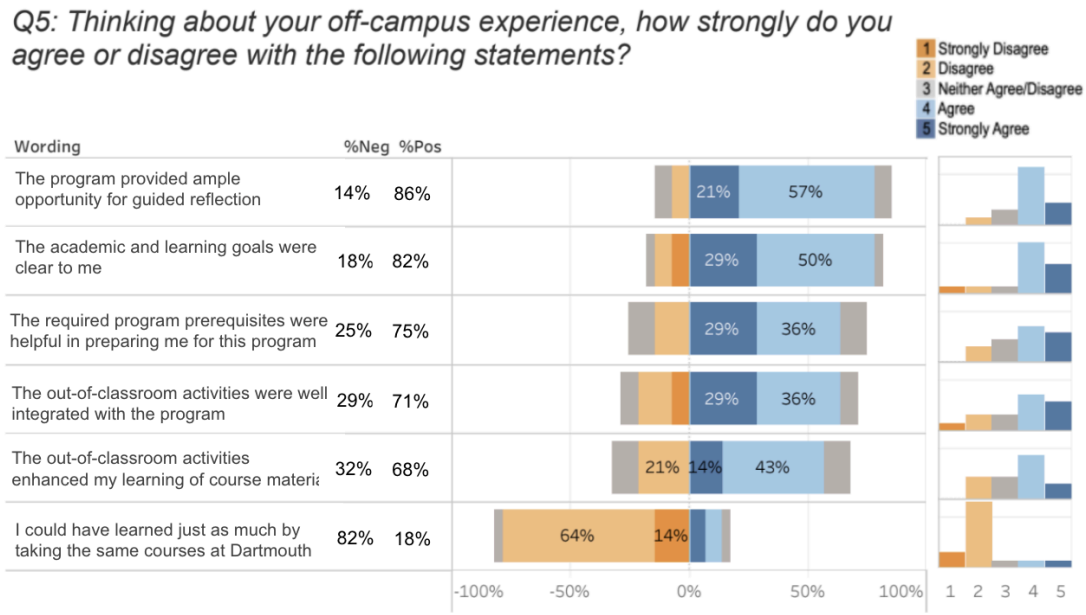
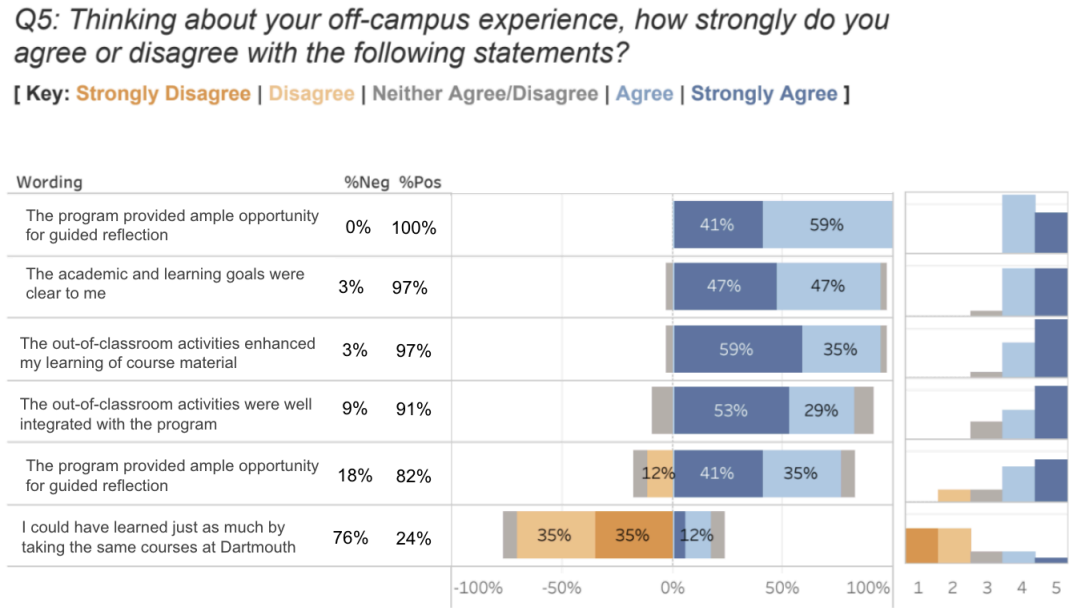


Figure 3: Survey B, 2024 Likert Results



In Survey B, students were also asked to reflect on how they planned to build upon the experiences they gained on the program. The three most prominent themes in these open-ended responses were (1) sustainable living, (2) German language skills, and (3) career interest in sustainability. Each occurrence of these themes was counted to create a textual theme analysis of students' responses.

Aligned with theme (1), fourteen students indicated they wished to build upon lessons they had learned about sustainable living. Students highlighted the important role of homestay families in inspiring them to live more sustainably. For example, a 2024 participant noted: "I am much more conscious about recycling waste and conserving energy after witnessing how well it's done in Berlin."

Aligned with theme (2), another thirteen students mentioned that they wanted to prioritize continued engagement with their German language skills. The strong motivation to engage further with German language resources on campus is reflected in responses such as this one by a 2024 participant: "I really hope to continue to improve my German abilities back on Dartmouth's campus - I am going to join the German club and maybe later apply for the [German language house]." Similarly, a 2022 participant noted that "I will continue to use my German language skills whenever I can; my speaking abilities improved drastically during the program."

As for theme (3), students expressed enthusiasm to pursue careers in sustainability that were fostered or renewed after participation in the program. For instance, one 2024 participant wrote: "I will be searching for potential careers in this field of urban sustainability, and consider more German classes," and another noted "I will start to look into jobs that incorporate the new forms of sustainability we learned about."

Figure 4: Survey B, Intentions for Post-Program Growth (n=28)

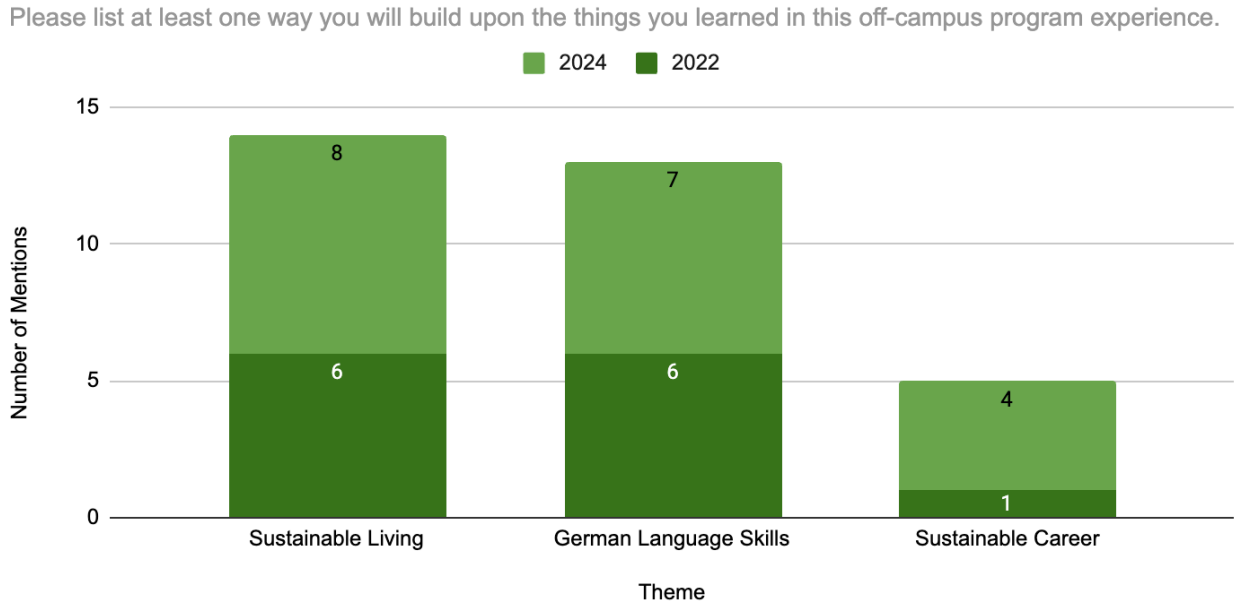


Figure 5: Survey C, Engineering Competencies Likert Results (n=24)

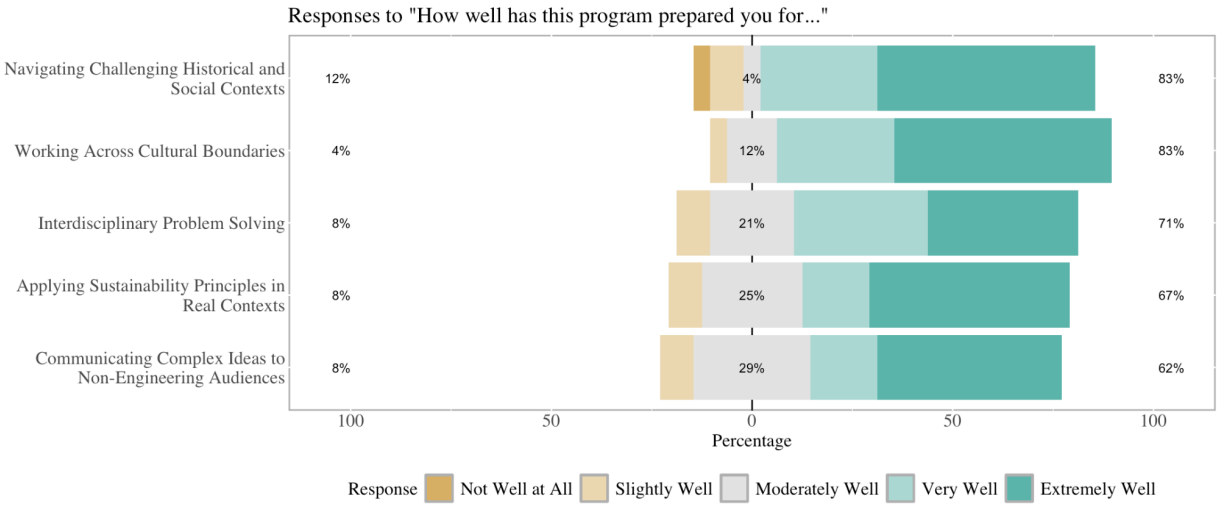
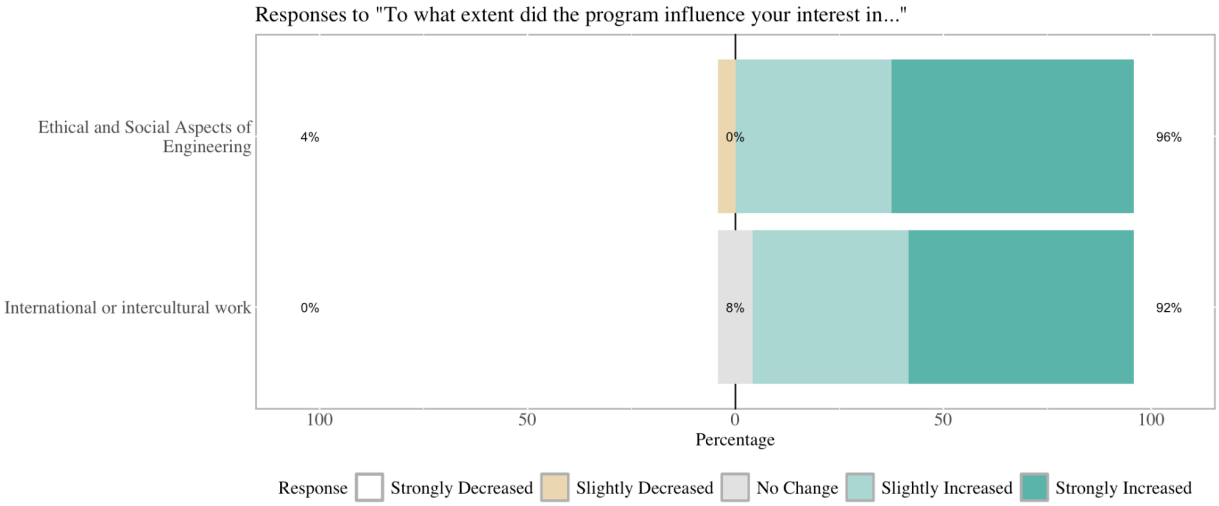


Figure 6: Survey C, Interest in Ethical, Social, International Work Likert Results (n=24)



In the longitudinal alumni survey (Survey C), respondents assessed the extent to which the program prepared them in key competencies, including interdisciplinary problem solving, cross-cultural collaboration, navigating historical and societal contexts, communicating with non-engineering audiences, and applying principles of sustainability. These competencies align closely with ABET student outcomes, particularly Criterion 2 (the ability to apply engineering design to produce solutions that meet specified needs while considering public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors), Criterion 3 (the ability to communicate effectively with a range of audiences) and Criterion 4 (ability to recognize ethical and professional responsibilities in engineering situations and consider global, economic, environmental, and societal contexts) (Criteria for Accrediting Engineering Programs, 2025 - 2026 - ABET, 2024). This alignment is particularly important in light of earlier student concerns about remaining on track for timely degree completion: by directly supporting

accredited engineering outcomes, the Green City program demonstrates that participation in a faculty-led, international study abroad experience can satisfy core curricular requirements while advancing essential professional competencies, rather than requiring students to trade technical rigor for global engagement.

Respondents reported strong impacts of the program on their broader professional perspectives. A large majority indicated increased interest in the ethical and social dimensions of engineering (96%) as well as in international or intercultural work (91%), and 83% reported feeling well prepared to work across cultural boundaries. At the same time, the results identify specific areas for continued program refinement. While 62% of respondents reported improved confidence in communicating complex technical ideas to non-engineering audiences, this outcome emerged less strongly than other competencies, suggesting an opportunity to more intentionally scaffold cross-disciplinary communication. Similarly, although most respondents felt prepared to engage with historical and social contexts, 12% indicated that the program did not adequately prepare them to navigate challenging or contested histories, pointing to the potential value of more explicit reflection, framing, or guided discussion in these areas. Together, these findings are being used to inform the ongoing and future program iterations, reinforcing strengths while targeting enhancements in communication and contextual engagement.

Figure 7: Survey C, Life and Career After Berlin (n=18)

To revisit themes from the immediate post-program evaluation (Figure 7, Survey B), alumni were asked in the longitudinal Survey C to provide concrete examples of how the Green City program has shaped their lives in the long term. Among the eighteen respondents who provided open-ended reflections, half reported that the program influenced them to pursue or seriously consider a career path related to sustainability. Several respondents emphasized the program's professional relevance, particularly in employment contexts. One alumnus described the program's value in addressing curricular gaps not otherwise filled on campus, noting: "I talk

about my experience in Berlin in almost every job interview I can… Green City FSP is singlehandedly the greatest academic offering at Dartmouth that is directly relevant to the industry/field I am interested in: decarbonizing the built environment through engineering."

Language learning also emerged as a significant area of impact. Approximately one-third of respondents highlighted the role of German language skills in shaping subsequent personal or professional experiences. As one alumnus reflected, "I went to Germany the following summer to teach English. I was extremely comfortable navigating around Germany on my own—something I never would've imagined doing prior to doing this program." In addition, several respondents reported an increased interest in living abroad, while others cited specific sustainable living practices they had adopted as a result of the program. Together, these reflections illustrate how the program's influence extends beyond the academic term, shaping career trajectories, global mobility, and everyday practices.

Discussion

The success of the Green City Foreign Study Program lies in its intentionally integrated interdisciplinary design, enabled through a close collaboration between the Engineering School and the Department of German Studies. This structure allows students to pursue technical, linguistic, and cultural learning simultaneously while continuing to make progress toward their degree requirements. Rather than treating engineering, language study, and the exploration of history and culture as parallel tracks, the program intertwines them through immersive, place-based experiences.

The program's impact is supported by a faculty-led cohort model that intentionally retains the academic certainty of the traditional "island" model while mitigating its limitations. Pre-approved, home-institution coursework eliminates credit-transfer uncertainty and directly addresses student concerns about delayed graduation, while homestays and immersive language use move students "off the island" in their daily lives. Together, these design choices preserve the island model's safety net while enabling sustained engagement with local practices of sustainability and culture.

Another central strength of the program is its commitment to iterative improvement grounded in systematic student feedback. From the program's inception through successive offerings, faculty have regularly reviewed student evaluations and adjusted program components accordingly. For example, feedback after the first iteration indicated that an overabundance of mandatory excursions limited students' ability to explore Berlin independently. In response, faculty redesignated 25% of excursions as optional. In the subsequent iteration, students no longer cited over-scheduling as a negative aspect of their experience. Similarly, feedback from the 2022 cohort revealed student frustration with the need to travel by subway between multiple classroom locations during the academic day, often several times per week. In response, faculty renegotiated classroom arrangements for the 2024 iteration so that all courses could be held in a single location, reducing transit time and improving the overall academic experience. These examples illustrate how targeted, responsive adjustments can meaningfully enhance both logistical efficiency and student satisfaction.

Despite its success in meeting student expectations for academic rigor and experiential quality, the program currently lacks the capacity to meet growing demand. Applications have increased by more than 160% since the program's inception, with 50 students competing for just 20 available spots in the most recent cycle. While this growth underscores the program's appeal, it also raises questions about sufficiency and scalability.

For institutions seeking to expand access to study abroad for engineering students, the Green City program highlights both opportunities and trade-offs. Faculty-led, interdisciplinary models can deliver high-impact learning experiences while maintaining curricular integrity and degree progress, but they require substantial institutional commitment, particularly with respect to faculty workload, cross-departmental coordination, and logistical support abroad. Scaling such programs, whether by increasing frequency, expanding capacity, or replicating the model in additional locations, will likely require new incentive structures, shared leadership models, or creative approaches that preserve pedagogical coherence while distributing operational demands. As engineering programs continue to emphasize global competence and societal context, the case of Green City shows that the faculty-led study abroad model offers a highly effective, though resource-intensive, pathway for integrating these priorities into the core curriculum.

Conclusion and Future Work

The Green City Foreign Study Program demonstrates that faculty-led, interdisciplinary study abroad models can effectively address long-standing barriers that limit engineering student participation in international experiences. By integrating accredited engineering coursework with language instruction, cultural immersion, and place-based learning, the program enables students to make progress toward degree completion while developing global, ethical, and sustainability-oriented perspectives essential to contemporary engineering practice. Importantly, the program's design responds directly to student-identified concerns regarding academic scheduling, credit transfer, and curricular rigor; concerns that have historically constrained participation in traditional exchange programs.

At the same time, the program's rapid growth in demand reveals an important and somewhat paradoxical outcome. While Green City was intentionally designed to alleviate pressure on limited exchange opportunities, it has itself become capacity constrained, with applications increasing by more than 160% since inception. Rather than indicating a shortcoming of the model, this imbalance suggests that student demand for well-integrated, discipline-aligned international experiences may be substantially greater than previously recognized. In this sense, the program's popularity reinforces the original premise motivating its creation: that many engineering students are eager to engage globally when structural and curricular barriers are removed.

Sustaining and expanding access to faculty-led, interdisciplinary study abroad experiences such as Green City requires careful attention to scalability, faculty capacity, and institutional context. While the program's co-led model, jointly staffed by faculty from Engineering and German Studies, has been central to its interdisciplinary coherence and educational impact, maintaining this level of engagement on an annual basis presents a significant sustainability challenge. Future work will examine the conditions under which annual offerings could be supported, including institutional incentive structures, distributed faculty leadership, and partnerships that preserve

curricular integrity while reducing individual faculty burden. Beyond this single institutional context, the findings presented here suggest that cross-departmental collaboration, particularly between engineering and the humanities, offers a promising pathway for internationalizing engineering curricula in ways that are academically rigorous, culturally grounded, and responsive to local context. Rather than simply exporting students abroad, programs like Green City emphasize reciprocal engagement, place-based learning, and sustained faculty involvement, contributing to the development of globally competent engineers who approach sustainability through an integrated technical, cultural, and societal lens.

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Appendix

Below are the definitions of themes identified in the open-ended responses of surveys A, B, and C.

Figure 1 Definitions (Survey A)	
Concern	**Definition**
Graduating on time	Mentions completing AB or BE on time, number of courses needed
Course scheduling	Mentions engineering course schedule, course availability, course sequencing, graduation timeline
Financial concern	Mentions financial burden of studying abroad, financial burden of not graduating on time
Getting into a program	Mentions competitiveness of applications, uncertainty about acceptance to a program
Missing on-campus commitments	Missing events/clubs/friends on campus, missing sports obligations
Language Concerns	Mentions concerns about language barriers, additional language coursework, engineering coursework in a foreign language
Safety/Logistics	Concerns on leaving the country, flying, food availability, cultural barriers, housing concerns

Figure 4 Definitions (Survey B)	
Intention	**Definition**
Sustainable Living	New sustainability habits, thoughtful sustainable living
German Language Skills	Building upon german language skills, using german language skills
Sustainable Career	Searching for a sustainability related job, interested in a career in sustainability

Figure 7 Definitions (Survey C)	
Growth Area	**Definition**
Sustainable Living	New sustainability habits, thoughtful sustainable living
German Language	Building upon german language skills, using german language skills
Sustainable Career	Searching for a sustainability related job, interested in a sustainable career
Interest in Living Abroad	Considering living abroad after the program, already living abroad