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# Bridging global competence and career readiness: Insights from three faculty-led internship abroad programs

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## Abstract

Engineering graduates must navigate an increasingly global workforce, requiring both technical expertise and intercultural competence. Yet engineering students remain underrepresented in study abroad, often limited by rigid curricula and internship demands. Faculty-led internship abroad programs offer a unique model that integrates professional experience, academic learning, and cultural immersion. This qualitative multi-case study explored the experiences of engineering students in three faculty-led internship abroad programs in Western Europe, Asia, and Africa. Drawing on interviews, reflective essays, and journals entries, five key outcomes were identified: career exploration, engineering skills development, global workplace adaptability, personal growth, and a broadened global perspective. Findings highlight how these programs foster global learning through authentic professional engagement, faculty mentorship, and structured reflection. This study underscores the potential of faculty-led internships abroad to bridge disciplinary gaps in global education and prepare engineering students for cross-cultural professional practice.

## Keywords

Engineering education; global competence; international education; internships

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## 1. Introduction

In the 21st century, engineering education faces the unique challenge of preparing students to meet the demands of a globalized workforce. Engineering projects, teams, and innovations routinely transcend national borders, requiring not only technical proficiency but also intercultural competence, adaptability, and global awareness (Buckley et al., 2023; Johri & Jesiek, 2014; Lucena & Downey, 2006). As technological and social systems grow increasingly interconnected, future engineers must be prepared to collaborate across diverse cultures, navigate unfamiliar work environments, and approach complex global challenges with a broad, socially conscious perspective (Johri & Jesiek, 2014; NAE, 2004).

In recognition of these evolving professional expectations, higher education institutions have increasingly prioritized global learning experiences as a key component of undergraduate education (AAC&U, 2024; Landorf & Doscher, 2023). Education abroad programs – including study, research, service-learning, and internships abroad – have become central to equipping students with the skills necessary to thrive in international settings.

Within the field of engineering, however, participation in education abroad has remained notably low when compared to other disciplines (IIE, 2023). Engineering students often encounter a distinct set of barriers, including rigid degree plans and the prioritization of domestic internships for career advancement, which can limit their ability to study abroad during their undergraduate years (Heisel & Stableski, 2009; Warnick et al., 2018).

One model that shows considerable promise in addressing this participation gap is the faculty-led internship abroad program. This educational approach allows students to gain international professional experience while fulfilling academic requirements under the guidance of a faculty member (The Forum on Education Abroad, 2023). Faculty-led internship abroad programs integrate intercultural learning, reflective practice, and career preparation, offering engineering students the opportunity to develop global competence while advancing technical and professional skills in real-world international contexts (Fisher et al., 2022; Niehaus & Wegener, 2019).

Despite the growing interest in global learning and internationalization within engineering education, limited research has explored the experiences of students who participate in faculty-led internship abroad programs (Jesiek et al., 2020). Much of the existing scholarship focuses on study abroad programs

structured around classroom learning, leaving a gap in understanding the outcomes of internship-based global experiences for engineering students (Davis & Knight, 2018; Streiner & Besterfield-Sacre, 2019).

The purpose of this study was to explore the experiences of engineering students participating in faculty-led internship abroad programs and to examine the elements that contributed to their personal, academic, and professional growth. Drawing on a multi-case study of three distinct programs located in Western Europe, Asia, and Africa, this research investigated how students engaged with the global work environment, navigated cross-cultural challenges, reflected on their growth, and developed global perspectives. Specifically, we addressed the two following research questions: What are the experiences of engineering undergraduate students who participate in a faculty-led internship abroad program? How do the different elements of the programs influence the students' experiences? Through this study, we aim to contribute to the growing body of research on international education by offering insight into how structured internship abroad experiences shape engineering students' global learning and competence.

## **2. Literature review**

Global learning has emerged as a central focus of undergraduate education, as institutions increasingly recognize the need to prepare students to engage with complex global systems and challenges. The American Association of Colleges and Universities (AAC&U) defines global learning as “a critical analysis of and engagement with complex, interdependent global systems and legacies [...] and their implications for people’s lives and the earth’s sustainability” (AAC&U, 2024, para. 2).

This emphasis on global learning reflects a broader institutional commitment to helping students develop competencies such as cultural awareness, ethical reasoning, and the ability to communicate effectively across diverse groups (Landorf & Doscher, 2023). Various universities have articulated definitions of global learning that underscore its interdisciplinary and real-world relevance, particularly in preparing students for careers in international and multicultural environments.

### **2.1. Global learning for engineering students**

Global learning is particularly vital for engineering students, as the profession increasingly demands the ability to collaborate across cultures, adapt

to unfamiliar regulatory and cultural environments, and design solutions that are ethically, socially, and environmentally responsible (Bielefeldt et al., 2021). In this context, global learning serves not only as an academic objective but also as a professional necessity.

Engineering operates within a rapidly globalizing labor market. Cross-border collaboration is now common, and many multinational firms rely on international teams for research, development, and production (National Academy of Engineering, 2004; Render et al., 2017). Consequently, engineering graduates must be prepared not just with technical expertise, but with the skills to function effectively in multicultural, international settings.

This reality has prompted accreditation bodies and professional organizations to formally recognize global competence as essential. For instance, ABET's accreditation criteria stress the need for engineers to design solutions that are mindful of global, cultural, social, and environmental contexts (ABET, 2023). Similarly, industry reports and employer surveys consistently highlight intercultural communication, teamwork, and adaptability as key attributes sought in engineering graduates (Warnick, 2011). The alignment between academic goals and industry needs underscores the central role of global competence in modern engineering education.

Although widely acknowledged, global competence in engineering lacks a universally agreed-upon definition. Scholars often describe it as a blend of technical knowledge, cultural sensitivity, adaptability, and communication skills required for success in international and intercultural professional environments (Jesiek et al., 2015; Parkinson, 2009).

Various frameworks emphasize both the cognitive and experiential aspects of global competence. For example, Deardorff's (2011) model highlights the importance of intercultural knowledge, reflective thinking, and behavioral adaptation in fostering effective interaction across diverse settings. Others suggest that a defining feature of globally competent engineers is their ability to work with individuals – both technical and non-technical – who conceptualize problems differently (Downey et al., 2006). Collectively, these models affirm that global competence is not just a set of knowledge, but a transformative outcome developed through intentional, immersive, and interculturally rich experiences.

As globalization reshapes engineering practice, competencies such as cross-cultural communication, interdisciplinary collaboration, and adaptability have become critical. Today's engineers are expected to be not only technically

capable but also culturally agile and globally informed (Downey et al., 2006; Parkinson, 2009). These skills are essential for addressing transnational challenges like climate change, sustainable development, and equitable access to technology – issues that require culturally nuanced, globally coordinated solutions.

To meet this evolving demand, engineering education has increasingly embraced the concept of the "global engineer" – a professional who can operate across cultural and disciplinary boundaries, engage meaningfully with diverse communities, and lead in international contexts. Educational initiatives designed to build global competence now take many forms, including study abroad programs, international research collaborations, service-learning projects, and overseas internships (Gerhardt et al., 2002; Parkinson, 2007)

## 2.2. Barriers to global learning for engineering students

Compared to students in liberal arts or social sciences, engineering students are significantly underrepresented in education abroad programs (Institute of International Education, 2023; Warnick et al., 2018). This disparity is not due to lack of interest, but rather to a complex combination of structural and cultural barriers. Engineering curricula are often tightly sequenced, leaving little room for semester-long study abroad without delaying graduation (Heisel & Stableski, 2009). In addition, internship experience is strongly emphasized in engineering career preparation, leading students to prioritize domestic co-ops or industry placements over international academic programs.

There are also disciplinary norms at play: engineering departments may not always integrate global learning outcomes into core courses, and students may perceive study abroad as peripheral to their technical training (Streiner & Besterfield-Sacre, 2019). Furthermore, cost, limited awareness of international program options, and concerns about language or cultural adaptation add additional layers of hesitation (Niehaus & Wegener, 2019). To address these barriers, many institutions have begun exploring alternative models that offer engineering students global experience without disrupting their academic trajectory – including short-term, faculty-led programs and internship-based study abroad models.

## 2.3. Internships abroad

Among the many pathways to global competence, internships abroad have gained traction for their unique ability to blend experiential learning with professional development. Unlike traditional classroom-based study abroad,

internships immerse students in real-world work environments, where they apply technical knowledge, navigate cultural norms, and collaborate with professionals from different backgrounds (Di Pietro, 2022; Moore et al., 2020). This model of experiential learning has been shown to foster key global learning outcomes such as intercultural communication, problem-solving, and adaptability.

For engineering students, internships have been identified as particularly effective in building global competence and professional readiness (Besterfield-Sacre et al., 2016). Working alongside professionals in a host country allows students to deepen technical skills while gaining firsthand insights into global industry practices (Downey et al., 2006). This dual benefit makes internships abroad a valuable option for students who may face challenges in participating in traditional study abroad programs.

Students can access internships abroad through multiple channels, including university-sponsored programs, third-party providers, academic departments, or independent arrangements. Some institutions leverage alumni networks and international partnerships to create structured opportunities, while others guide students in securing placements directly. This flexibility enables students to pursue internships that align closely with their academic and career goals.

#### 2.4. Faculty-led internship abroad programs

Faculty-led internship abroad programs are a distinct subcategory of experiential education abroad. These programs integrate structured academic coursework with supervised professional placements and are typically short-term (4–12 weeks), credit-bearing, and highly contextualized. Faculty members play a central role – not only as instructors, but also as mentors, cultural guides, and academic facilitators.

This model offers several advantages for engineering students. First, it allows for precise curricular alignment: faculty can ensure that assignments, learning objectives, and internship placements reinforce program outcomes. Second, faculty presence provides a critical support structure that helps students navigate unfamiliar cultural and professional contexts. Third, embedded reflection assignments and guided discussions can amplify learning by helping students connect their experiences to broader disciplinary and global issues (Delusé & Thomas, 2022; Fisher et al., 2022). By integrating internships into the academic curriculum, universities can ensure that students

earn credits while participating in internships abroad, which provides both academic and professional value.

Commonly found in the field of education, the use of international teaching assignments for student teachers emerged in the 1980s as an important way to expand the worldview of new teachers and bring global perspectives to their curriculum development and classroom instruction. Since then, the positive impact of international experiences on preservice teachers has been thoroughly documented (Batey & Lupi, 2012; Merryfield, 2002; Paras et al., 2017; Shiveley & Misco, 2015; Stachowski & Sparks, 2007) and the availability of such programs continues to be robust, offering valuable opportunities for cultural immersion, skill development, and professional growth in diverse global settings.

The internship abroad model has also proven to be an effective approach for the field of social work, offering students the chance to engage deeply with different cultural contexts while benefiting from structured mentorship and guidance. This model provides a strong support system, allowing students to navigate complex social environments while also reflecting on their professional development in a multicultural setting. Faculty-led internships are particularly prevalent in social work due to the nature of the field, which requires the integration of cultural sensitivity, critical thinking, and hands-on practice (Asamoah et al., 1997; Kreitzer et al., 2012; Panos et al., 2004).

In the healthcare professions, international work learning experiences, often embedded in faculty-led internship abroad programs, offer students hands-on clinical practice and the opportunity to develop cultural competence in different healthcare settings. These experiences offer unique opportunities for professional growth, cultural competence, and enhanced clinical skills. Through these international experiences, healthcare professionals learn to navigate diverse medical conditions and treatment approaches not commonly seen in their home countries. This exposure not only facilitated innovative thinking and enriched their perspectives on healthcare but also increased their confidence as a healthcare professional (Geelhoed, 2009; Strong et al., 2014).

For engineering students in particular – a group historically underrepresented in study abroad – faculty-led internships abroad provide a compelling alternative. These programs address the common barrier of “time-to-degree” by offering credit-bearing professional experience that aligns with students’ academic and career goals (Streiner & Besterfield-Sacre, 2019; Warnick et al., 2018). Although these programs are growing in popularity,

research on their effectiveness – particularly in the context of STEM and engineering education – remains limited. Most existing studies focus on semester-length programs, traditional classroom study abroad, or non-credit-bearing internships. As such, faculty-led internship abroad models occupy a relatively unexplored niche in the literature, despite their alignment with both institutional goals and engineering students' needs.

## 2.5. Program elements

Faculty-led programs are composed of multiple elements that shape students' academic, professional, and intercultural experiences. While The Forum on Education Abroad (2023) and its *Standards of Good Practice* provide a broad framework emphasizing intentional design – from pre-departure preparation to post-program reflection – the specific structure and practices of these programs vary widely. The *Guidelines for Internships Abroad* (Merson et al., 2022) underscore the value of integrating theory with practical application, encouraging high-impact practices like developmental relationships, clear learning outcomes, and meaningful cross-cultural engagement.

Research has shown that simply placing students abroad does not guarantee deep learning (Snodgrass et al., 2021; Vande Berg et al., 2012). Instead, programs must be deliberately structured to promote guided reflection, cultural immersion, and professional skill development (Delusé & Thomas, 2022; Fisher et al., 2022). Engle and Engle's (2003) seven program elements – such as sojourn length, language use, housing, and experiential learning – offer a foundational framework, but are not tailored to the nuances of internship-based programs.

Several studies have examined how specific elements influence student outcomes. For example, Levonisova et al. (2015) found that duration, reflection, and global coursework correlated with higher global preparedness. Delusé and Thomas (2022) emphasized the need for clearer structures in internship programs, highlighting gaps in consistency, mentorship, and cultural immersion. Destination choice also significantly shapes experiences, with culturally distinct locations promoting deeper intercultural learning (Eder et al., 2010; Lane-Toomey & Lane, 2012).

The shift toward short-term programs (Institute of International Education, 2023) has prompted debate over program length. While longer stays offer more sustained immersion (Farrugia & Sanger, 2017), short-term programs – when intentionally designed – can deliver high-impact outcomes (Dwyer, 2004; Fisher et al., 2022).

Program mode also matters as internships abroad offer practical engagement, career relevance, and intercultural exposure that differ from traditional study abroad formats (Boni et al., 2019; Gozik & Oguro, 2020). Well-aligned placements enhance both technical and global competencies (Delusé & Thomas, 2022; Streiner & Besterfield-Sacre, 2019). Although longer internships provide deeper integration (Di Pietro, 2022), short-term placements can still foster global mindsets with proper design and support (Knutson Miller & Gonzalez, 2016).

Language proficiency, both pre-departure and in instruction, shapes cultural immersion and academic engagement (Ogden, 2015; Vande Berg & Connor-Linton, 2015). Likewise, the academic context – such as direct enrollment vs. faculty-led settings – affects interaction with local peers and cultural norms (Gozik & Oguro, 2020). Housing also impacts immersion, with homestays offering benefits but requiring alignment with program goals (Castiglioni, 2012).

Faculty leadership and peer interaction play critical roles in supporting student learning and intercultural development (Goode, 2007; Whatley, 2018). Faculty guide reflection, mentor students, and foster meaningful engagement through experiential learning activities like service, research, or internships. Structured reflection – through journals, discussions, or debriefings – is essential in transforming experiences into meaningful learning (Levonisova et al., 2015; Wrobetz et al., 2023).

Together, these elements show that student experiences in faculty-led internship abroad programs are shaped by a combination of intentional design, supportive structures, and opportunities for cultural and professional engagement. Aligning program components with institutional goals and student needs is essential to maximizing both academic and intercultural learning.

## 2.6. Gaps in research

While there is a growing body of literature on global learning and engineering education, relatively few studies have focused specifically on faculty-led internship abroad programs, particularly within the context of undergraduate engineering. Much of the existing research tends to examine traditional study abroad programs as distinct avenues for global engagement. These models, while valuable, often overlook emerging program types that blend multiple pedagogical approaches, such as short-term, faculty-led

internships that integrate academic coursework, applied professional experiences, and sustained faculty mentorship.

Such integrated programs are particularly relevant for engineering education, where the combination of technical skill development and intercultural competence is increasingly essential. Despite this relevance, research on how these hybrid models influence students' global learning remains limited. This study addresses that gap by investigating how faculty-led internships abroad contribute to the development of global competence among engineering students. Specifically, it explores the ways in which programmatic elements – such as structured academic components, the active involvement of faculty as mentors and facilitators, and the inclusion of guided reflection – shape students' academic, professional, and personal growth. By focusing on short-term, experiential programs situated within a faculty-led framework, this research provides insight into how intentional design can foster meaningful outcomes in global engineering education.

### **3. Methodology**

This study employed a qualitative multi-case study design to explore the experiences of engineering undergraduate students who participated in faculty-led internship abroad programs. A case study approach was selected to enable an in-depth examination of student experiences within the specific academic, cultural, and professional contexts of the programs. Each internship abroad program was treated as an individual case, allowing for both within-case and cross-case analysis. The research was approved by the [redacted university] Institutional Review Board.

#### **3.1. Program contexts**

This study examined three faculty-led internship abroad programs administered by the College of Engineering at a large U.S. research university. Each program was implemented in a distinct global region – Western Europe (Program A), Asia (Program B), and Africa (Program C) – and was selected to allow for comparative analysis. While the programs shared a common structural foundation, they were intentionally designed with key differences in focus, format, and instructional leadership. These distinctions enabled the exploration of how variation in program characteristics and cultural settings shapes student learning outcomes and professional development in global engineering contexts.

All three programs integrated three core elements: (1) an engineering internship placement, (2) two academic courses for university credit, and (3) active faculty mentorship throughout the duration of the program. This shared framework supported cross-case comparison, while the differences in program design—such as duration, location, enrollment size, disciplinary scope, internship type, and faculty expertise—provided meaningful contrasts relevant to the study’s goals. Key program features are summarized in Table (1).

Program A was a 10-week experience that included a one-week cultural orientation at the outset. It was open to students across all engineering disciplines and led by a doctoral-level academic advisor with expertise in higher education leadership. Students were placed in individualized internships at start-up incubators and small-to-medium enterprises across sectors such as biomedical engineering, civil infrastructure, mechanical systems, and environmental sustainability. The program emphasized discipline-specific application of technical knowledge, one-on-one mentorship with industry professionals, and integration of academic and professional learning. The case study for this program focused on four female students from civil engineering, aerospace engineering, and computer science.

Program B lasted eight weeks and began with a condensed three-day cultural orientation. Led by a master’s-level academic advisor, it welcomed students from all engineering majors and featured both individual and small group internship placements in nonprofit organizations and research centers. Projects included data analytics, systems design, and software development. The program prioritized collaborative problem-solving and cross-cultural teamwork, reflecting the interdisciplinary and fast-paced nature of contemporary engineering practice. The case study examined the experiences of six students (five male, one female) from computer science and biomedical engineering.

Program C was a seven-week program with cultural learning embedded throughout rather than concentrated in an orientation week at the beginning of the program. It was designed specifically for students in computer science and digital arts and sciences and led by a Ph.D.-level faculty member with disciplinary expertise in computer science. Students participated in team-based, project-oriented internships with community organizations, working on challenges related to youth education, environmental sustainability, and access to digital technologies. Academic coursework emphasized ethical engagement,

co-design, and global awareness. The case study drew on the experiences of four students (three male, one female), all majoring in computer science.

Collectively, these three programs represented distinct models of global experiential learning in engineering education. Program A offered highly specialized, discipline-aligned internships that helped students deepen technical expertise and clarify career trajectories. Program B provided early-career exposure to a broad range of engineering applications through hybrid placements, supporting skill development and career exploration. Program C emphasized the social dimensions of engineering through community-centered projects in resource-constrained settings, fostering ethical awareness and socially responsible professional identities.

The structured variation across these program contexts provided a valuable framework for examining how differences in faculty expertise, internship structure, disciplinary focus, and approaches to cultural learning shape engineering students' development of global competence. These distinctions enabled a nuanced analysis of how students engage with and adapt to diverse global learning environments within the context of short-term, faculty-led international internships.

**TABLE (1)**  
OVERVIEW OF THE THREE CASES IN COUNTRY A, COUNTRY B, AND COUNTRY C

	<b>Program/Country A (Western Europe)</b>	<b>Program/Country B (Asia)</b>	<b>Program/Country C (Africa)</b>
<b>Program length</b>	10 weeks	8 weeks	7 weeks
<b>Enrollment</b>	24	24	20
<b>Number of study participants</b>	4	6	4
<b>Mode of cultural learning</b>	One week before the start of the internship and embedded in the program	Intensive orientation three days before start of the internship	Embedded throughout the program
<b>Program leader</b>	Doctoral-level academic advisor	Master's-level academic advisor	Doctoral-level instructional faculty member
<b>Disciplines</b>	All majors	All majors	Computer science

<b>Internship format</b>	Individual	Individual/ Group	Group project based
<b>Host companies/ organizations</b>	Startup incubators/companies Small-medium enterprises	Non-profit organizations	Community organizations

### 3.2. Data sampling

Participants were recruited from three faculty-led internship abroad programs located in Country A (Western Europe), Country B (Asia), and Country C (Africa). While each program included both engineering and non-engineering students, only students enrolled in engineering majors were eligible for this study.

Recruitment was facilitated by the program directors, who distributed an informational email 2–4 weeks prior to program departure. The recruitment email outlined the purpose of the study, participation details, and methodology, allowing students adequate time to consider involvement. Nineteen engineering students agreed to participate in Phase 1 of the study, which involved pre-departure and in-country data collection. Of these, fourteen students completed Phase 2 follow-up interviews after returning to the U.S., forming the final sample for qualitative analysis. These students were distributed as follows: four from Program A, six from Program B, and four from Program C.

While recruiting from pre-existing program cohorts provided logistical benefits – such as streamlined communication and timely access to participants – it also introduced potential sampling bias. Students who opted into the follow-up interviews may have had especially strong (positive or negative) experiences, which could influence the overall findings. This limitation is acknowledged in interpreting the results.

Participants varied by academic year and discipline. Program A included students from civil engineering, aerospace engineering, and computer science. Program B involved primarily first- and third-year students from computer science and biomedical engineering. Program C, designed specifically for computer science majors, included mostly third- and fourth-year students in computer science and digital arts and sciences. The more rigorous prerequisites for Program C also contributed to a higher representation of advanced students. This variation across academic levels and disciplines provided a richer, more nuanced understanding of student experiences. Table (2) provides additional demographic details.

**TABLE (2)**  
PARTICIPANT PROFILES

Program	Participant ID	Gender	Current year in college	Current major
<b>Program A</b>	A1	Female	2nd	Civil Engineering
	A2	Female	2nd	Civil Engineering
	A3	Female	4th	Aerospace Engineering
	A4	Female	3rd	Computer Science
<b>Program B</b>	B1	Male	2nd	Computer Science
	B2	Male	1st	Biomedical Engineering
	B3	Male	3rd	Computer Science
	B4	Male	1st	Computer Science
	B5	Male	1st	Computer Science
	B6	Female	1st	Computer Science
<b>Program C</b>	C1	Male	3rd	Digital Arts and Sciences
	C2	Male	4th	Computer Science
	C3	Female	3rd	Computer Science
	C4	Male	3rd	Computer Science

### 3.3. Data collection

In this study, we employed a case study methodology (Stake, 2006; Yin, 2017), utilizing multiple data sources to create a comprehensive understanding of participants' experiences. These included semi-structured interviews, reflection papers, and journal entries, which allowed for triangulation and provided multiple perspectives on participants' academic, personal, and cultural development.

Each participant engaged in two interviews: one pre-program and one post-program. Pre-program interviews (20–30 minutes) were designed to gather background information, including participants' academic histories, prior international exposure, expectations for the internship, and familiarity with the host country and program director. These early interviews set a baseline for understanding each participant's initial perspectives and served to establish rapport.

Post-program interviews (45–60 minutes) took place 2–4 weeks after participants' return. These interviews used open-ended questions to elicit in-depth reflections on participants' personal, academic, and professional experiences during their internship abroad. Questions addressed daily routines, job responsibilities, cultural adaptation, challenges encountered, faculty

support, and the impact of the experience on their future career goals. Open-ended prompts such as “Can you describe a typical day at your internship?” and “To what extent did you achieve your goals for the program?” allowed participants to share detailed narratives while enabling flexibility in response.

Interviews also probed participants’ perceptions of the academic components of the program and the alignment between classroom preparation and real-world application. Participants were encouraged to identify “lightbulb moments,” describe how they handled challenges, and reflect on interactions with faculty directors. To capture long-term impacts, students were asked how they would present their experiences to future employers and what, if anything, they would do differently.

To enrich the interviews, participants shared written reflections or journal entries submitted during or after the program. Programs A and C required a final reflection essay, while Program B incorporated weekly journaling. These documents offered additional insights into student growth and were used during interviews to prompt elaboration and clarify key themes.

All interviews were conducted via Zoom, recorded with consent, and transcribed using a secure transcription service. Supporting documents – including reflection papers and journal entries – were stored alongside interview transcripts on an encrypted local drive, using pseudonyms to maintain confidentiality. This multimodal data collection approach enhanced analytical depth by triangulating narratives across verbal, written, and visual sources.

### 3.4. Data analysis

For this study, we analyzed three data sources – interviews, reflection papers, and journal entries – separately at first to explore their unique themes, while integrating findings across sources to build a comprehensive understanding of the case. Following Baxter and Jack (2008), we avoided treating these data sources independently, ensuring convergence during the analysis phase. The interview transcripts were initially analyzed through open coding, identifying key phrases related to participants’ experiences abroad (Saldaña, 2015). We also used predetermined categories based on research questions, such as professional development and personal growth, to structure the analysis. The combination of open and *a priori* coding helped capture emergent themes while aligning with the research objectives.

For reflection papers and journal entries, we applied open coding to identify significant themes and compared these findings with the interview data to assess alignment. After analyzing each data source independently, we integrated the findings using cross-data comparison within each case, highlighting recurring themes across sources. This approach facilitated a comprehensive understanding of participants' experiences. Cross-case analysis revealed patterns and differences across programs, such as variations in internship structures and cultural engagement strategies. An iterative, constant comparative approach was used throughout the analysis to systematically categorize the data and identify recurring themes, ensuring a thorough analysis of the data and contributing to the study's overall conclusions.

During cross-case analysis, subthemes were considered significant when they were supported by multiple participants and appeared across more than one data source (e.g., interviews and written reflections). Subthemes mentioned by only a single participant or representing fewer than approximately 10% of coded excerpts were not included as standalone subthemes, as these isolated instances did not represent shared patterns across participants. These instances were still considered during analysis but were interpreted as individual experiences rather than representative findings. This approach ensured that reported themes reflected recurring patterns rather than isolated observations, consistent with qualitative case study methodology emphasizing thematic recurrence and cross-participant validation.

### 3.5. Positionality

This study is grounded in a constructivist paradigm, which recognizes that knowledge is co-constructed through interactions between individuals and shaped by context, experience, and perspective. As qualitative researchers, we acknowledge that our own background influences the research process – from the framing of questions to the interpretation of findings.

The lead author's professional experience in international engineering education and personal history of studying and working across diverse cultural settings inform how they view global learning and the development of intercultural competence. These experiences shape their understanding of students' challenges and growth in international internship contexts and contribute to the lens through which they interpret their narratives.

Recognizing that they brought these perspectives into the research process, they took deliberate steps to enhance reflexivity and reduce bias. This

included maintaining a reflexive journal, practicing critical self-awareness during interviews and analysis, and consulting with peers to test and challenge their interpretations. These efforts were essential to ensure that meaning was constructed through engagement with participants' perspectives rather than imposed by their own.

## **4. Findings**

To support clarity and consistency in the analysis, each theme represents a broad category of student development observed across the cases, while subthemes reflect more specific dimensions within each category. Career exploration refers to students' evolving understanding of professional interests, career pathways, and workplace preferences. Engineering and professional skills development refers to the application and growth of technical, problem-solving, communication, and workplace skills. Navigating a global work environment captures students' adaptation to cultural norms, communication styles, and workplace expectations. Personal growth includes increased self-confidence, independence, and resilience. Finally, global perspective refers to expanded awareness of cultural diversity and the societal and ethical dimensions of engineering practice.

This study identified five central themes that captured students' growth and learning through their participation in faculty-led internship abroad programs: (1) career exploration, (2) engineering and professional skills development, (3) navigating a global work environment, (4) personal growth, and (5) developing a global perspective. While these themes were consistent across all three programs, the depth and emphasis varied depending on the program's structure, cultural setting, and the individual experiences of participants. Table (3) highlights representative subthemes observed within each program. The absence of a subtheme (represented by a grey box) does not indicate that the outcome was not present, but rather that it was less prominent in the available data or expressed differently. All five major themes were observed across the three programs, although the depth and emphasis varied depending on program structure and context.

TABLE (3)

OVERVIEW OF PROMINENT THEMES AND SUBTHEMES IDENTIFIED ACROSS MULTIPLE DATA SOURCES WITHIN EACH PROGRAM

Themes	Program A	Program B	Program C
<b>Career exploration</b>	Skills/industry		
	Work environment	Work environment	
	Global perspective	Global perspective	Global perspective
<b>Engineering skills</b>	Technical skills	Technical skills	Technical skills
	Self-management skills	Self-management skills	
	Communication		
		Collaboration	Collaboration
			Community-based design
<b>Navigating a global work environment</b>	Leadership style		
	Communication styles		
			Workplace culture
<b>Personal growth</b>	Self-confidence		
	Adaptability		
	Social dynamics	Social dynamics	Social dynamics
<b>Global perspective</b>	Engagement with local culture and environment		Engagement with local culture and environment
			Appreciation for global diversity

#### 4.1. Career exploration

Career exploration was observed across Programs A, B, and C; however, the ways in which students experienced career exploration varied depending on the structure and focus of each program. Programs offering individualized placements appeared to provide clearer opportunities for discipline-specific career clarification, while collaborative and community-based models supported broader exploration of engineering roles and workplace environments. Because this exploratory qualitative study did not measure the extent or magnitude of these outcomes, the findings highlight the presence and nature of career exploration rather than the relative effectiveness of each program model.

One participant from Program A shifted her focus from water resources to structural engineering after hands-on exposure, stating, “I wanted to go straight into water resources engineering, but after working at the consulting firm, I’ve decided to pursue a Master’s in Structural Engineering” (interview). Another from Program C reflected on confirming her interest in real-world

work, “This program was an easy way to see if I would enjoy the work while still earning class credits” (reflection essay). Participants also recognized the importance of work environment fit; one noted that remote supervision was challenging and reinforced her preference for in-person interactive workplaces. Furthermore, several students acknowledged how working in new cultural contexts expanded their openness to international careers post-graduation. Together, these findings suggest that career exploration within faculty-led internship abroad programs can provide opportunities for engineering students to apply technical skills, reflect on their professional identity, and consider how their career goals align with their personal values and broader societal contexts.

## 4.2. Engineering and professional skills development

Developing engineering skills was a core focus across Programs A, B, and C, although each program used different approaches to support technical and problem-solving growth within varying contexts. All three programs gave students opportunities to deepen their engineering knowledge while adapting their skills to diverse work environments and community needs through hands-on tasks and industry-relevant challenges.

Participants consistently described significant growth in both their technical skills and professional workplace abilities as a result of their internships. They reported improvements in problem-solving, technical communication, and self-management. They successfully applied their classroom knowledge to real-world engineering challenges, often in unfamiliar, cross-cultural settings. This experience helped participants like A2 build adaptability and confidence in their technical abilities. Even though she acknowledged that her contributions were “something they could have done without me,” she still felt that she “contributed” (interview).

Participant B2, who worked with Arduino and programming, said during the interview, “I’m really interested in medical devices, but after working hands-on with programming during my internship, I’m considering a minor in computer science. That experience was invaluable.” Participant A4 shared in her reflection essay, “Working remotely boosted my confidence and resourcefulness, especially handling coding tasks without direct supervision.”

Similarly, C2 discussed how the internship bridged academic theory with professional practice, stating, “The internship I undertook this summer served as a pivotal experience that bridged the gap between my academic pursuits and the real-world professional landscape” (reflection essay). Reflecting on the

transformative impact of his internship experience, the participant planned to continue working on the project for his senior capstone class, which will further enhance his skills in a practical, socially impactful context: "This ongoing commitment not only allows me to contribute to [the organization's] impactful initiatives but also enhances my technical skills in a meaningful context" (reflection essay). These insights show how real-world projects across diverse settings challenge students to adapt and sharpen their professional skills, preparing them for the complex demands of engineering careers.

### 4.3. Navigating a global work environment

Another central theme across all three programs was the need for students to adjust to new cultural and professional norms. Whether navigating different leadership styles, communication expectations, or workplace cultures, participants were consistently challenged to reflect on their assumptions and adapt their behaviors – an essential skillset for globally engaged engineers.

Participant A1 shared her experience of adapting to unfamiliar communication styles, explaining, "It took me a while to realize that when someone says, 'that's interesting,' they might actually be saying they don't agree... I had to learn how to read between the lines" (interview). Similarly, Participant A3, working in a culture with a more relaxed approach to time, reflected, "Meetings started late, and deadlines felt more fluid... at first it stressed me out, but I learned to let go of my rigid expectations" (interview). These insights illustrate how even subtle cultural cues can influence workplace dynamics and require students to develop flexibility and cultural awareness.

In Program C, participants encountered a non-traditional leadership style while navigating a global work environment, particularly within the context of community-focused organizations. Participant C4 expressed initial frustration with the challenges in communicating with clients, sharing that "I originally was getting frustrated with the harder communication with the client" (reflection essay). However, as he adjusted his perspective, he recognized the advantages of having greater independence in his work. With fewer direct instructions, he gained autonomy in decision-making, which allowed him to explore his technical skills more freely. This shift in communication style ultimately helped him adapt to the global work environment and enhanced their problem-solving abilities.

Across all three programs, the theme of navigating global work environments was woven into the fabric of the internship experience – whether

through structured mentorship, team-based collaboration, or community engagement. Each model offered a distinct but complementary pathway for students to build intercultural competence and adaptability, preparing them to engage thoughtfully and effectively in diverse professional settings.

#### 4.4. Personal growth

Beyond academic and professional development, students consistently described personal growth in areas such as self-confidence, independence, resilience, and self-awareness. Living and working abroad encouraged participants to confront uncertainty, manage discomfort, and develop new coping strategies. For many, this aspect of the experience proved to be transformative.

Participant A2 reflected on how her internship experience taught her the value of perseverance and adaptability. “Through my struggles, I learned that I feel most successful when I try, fail, and try again,” she shared in her reflection essay, emphasizing the importance of resilience in overcoming challenges. This process of trying, failing, and persisting not only helped her grow but also demonstrated her ability to adapt to new environments and circumstances.

In his interview, Participant B5 reflected on the challenge of arriving in a new country alone: “That was one of the biggest challenges I’d gone through in life so far... I think I’ll be more of a risk-taker now. Less stressed in general about trying new things.” Similarly, Participant B3 admitted to initially fearing the study abroad experience, but noted, “Taking on this challenge contributed to my self-assurance... I realized I could handle more than I thought I could” (interview). These reflections illustrate how moments of discomfort evolved into lasting personal insight. Others emphasized the importance of building social connections while abroad, describing the experience as deeply meaningful and transformative. Across all programs, students reported shifts in perspective and a strengthened sense of self.

Personal development emerged as a significant outcome across Programs A, B, and C, though each program emphasized different dimensions of growth – such as confidence, adaptability, and empathy – based on its unique structure and goals. Whether through structured coursework, team-based collaboration, or community engagement, each program created opportunities for students to navigate complex social environments and build resilience as they adapted to new cultural and professional contexts.

#### 4.5. Development of a global perspective

Finally, students reported a deepened appreciation for cultural diversity and global interconnectedness. Through cultural immersion, professional collaboration, and guided reflection, participants expanded their understanding of the social, ethical, and cultural dimensions of engineering practice. Many spoke about how these experiences shaped not only their professional outlook but also their broader worldview.

Participant A3 described the shift in perspective that came from living rather than simply visiting another country: “I didn’t see myself as a tourist. I was experiencing and living... It changed how I think about culture and my place in it” (interview). Similarly, Participant B4 reflected on how the international setting broadened his thinking: “It showed me how different perspectives can foster creativity. It made me think more broadly about my work and how it affects people” (journal entry). For Participant B5, the discomfort of adapting to a new environment became a catalyst for growth: “The only way to grow is through discomfort or challenge... now I want to work in other countries – I feel like I can adapt anywhere” (interview). These reflections underscore the transformative impact of international experiences on students’ understanding of themselves and the world, particularly as they relate to the broader implications of engineering work.

The development of a global perspective emerged as a fundamental component across all three programs. By engaging with local cultures, navigating unfamiliar social norms, and reflecting on their experiences, students were able to see engineering not just as a technical discipline but as one embedded in complex cultural and ethical contexts. Each program offered distinct opportunities for students to expand their worldviews and apply their skills with greater cultural sensitivity.

#### 4.6. Program elements

This exploratory case study examined how different program elements, such as internship structure, cultural immersion, team-based projects, and mentorship – shaped student experiences, but it was not designed to measure the degree to which specific program elements caused or produced particular learning outcomes. While patterns emerged suggesting relationships between program structure and types of student development, the qualitative data allow for interpretation of how students experienced these programs rather than definitive conclusions about the comparative effectiveness of each model.

Further quantitative and longitudinal research would be necessary to determine the extent to which specific program elements influence measurable learning outcomes.

This finding aligns with existing literature on faculty-led programs, which underscores the importance of program structure in supporting students' professional development, intercultural competence, and personal growth (Engle & Engle, 2003; Spenader & Retka, 2015; Streiner & Besterfield-Sacre, 2019).

#### 4.6.1. Internship structure and professional development

The structure of internships across Programs A, B, and C played a pivotal role in shaping the themes of Career Exploration and Engineering Skills. While all three programs emphasized hands-on learning, their distinct formats influenced the nature and depth of students' experiences.

Program A offered individualized placements aligned with students' academic backgrounds, fostering focused career exploration and discipline-specific skill development. This one-on-one model supported students in applying technical knowledge in professional contexts and helped clarify career goals. Research affirms the effectiveness of such placements in supporting practical skill acquisition and professional integration (Besterfield-Sacre et al., 2016; Di Pietro, 2022).

Program B combined individual internships with collaborative, team-based projects in a technologically advanced setting. This hybrid approach exposed students to diverse roles within the tech industry and fostered early-career skill building. The dynamic, high-tech environment supported both technical and interpersonal development, which aligns with literature advocating for early, varied professional exposure in global contexts (Knutson Miller & Gonzalez, 2016).

Program C focused on community-based engineering projects in collaboration with local organizations. Although not formally structured as service learning, the program emphasized real-world problem solving and cultural responsiveness. Students developed engineering skills while addressing social challenges, which promoted empathy and a sense of social responsibility. Literature on service-learning supports the value of such contextualized engagement in enhancing both professional and intercultural competencies (Goncher & Devitt, 2017).

Each internship model, whether individualized, hybrid, or community-based, demonstrated how intentional program design fosters technical proficiency, career insight, and intercultural adaptability. Together, they illustrate the transformative potential of varied experiential learning formats in cultivating globally competent engineers.

#### 4.6.2. Reflection and mentorship

Reflection and professional development activities were integral to supporting students' growth across all three programs. These practices enabled students to connect their internship experiences with long-term professional goals and personal development.

Program A implemented structured reflection through written essays and targeted professional development workshops. These activities encouraged students to critically analyze their experiences, integrate theory with practice, and explore global workplace norms. Guided reflection supported students' self-awareness and adaptability, echoing findings that structured reflective practice enhances professional readiness and intercultural competence (Delusé & Thomas, 2022).

Program B utilized unstructured journal entries, offering students freedom in documenting their experiences. While some students reflected deeply on cultural adaptation or technical learning, the absence of prompts led to inconsistent depth and focus. As supported by the literature, unguided reflection can limit the ability to assess growth across common themes and may reduce opportunities for critical self-assessment (Stebbleton et al., 2015).

Program C prioritized mentorship as a reflective tool. The program director provided individualized guidance, helping students connect their technical work to broader societal impacts. This mentorship model encouraged ethical reflection and alignment of personal values with professional aspirations, reinforcing students' understanding of engineering as a socially embedded practice.

Overall, Programs A and C offered structured, intentional reflection that fostered career clarity and global awareness, while Program B's open-ended format encouraged flexibility and spontaneous cultural insight. Collectively, these approaches underscore the value of tailored reflection and mentorship in supporting personal and professional development during international engineering experiences.

#### 4.6.3. Program director

The role of the program director had a notable impact on students' experiences across the three programs, particularly in shaping professional development and personal growth.

In Program C, the director's sustained, hands-on mentorship was instrumental. Through active guidance and one-on-one conversations, students were encouraged to connect their technical work to broader social impact, aligning career goals with community needs. This model of mentorship reinforced the value of faculty leadership in facilitating transformative learning abroad.

In contrast, Program A featured strong initial faculty presence during the first two weeks, after which guidance shifted to remote support. While students appreciated the academic help, they relied more on local coordinators for navigating cultural and professional settings.

Program B faced a unique challenge when the director contracted COVID-19 and was absent during orientation. Consequently, participants had limited direct engagement with the director and leaned heavily on local coordinators for on-site support.

This contrast revealed the importance of continuous, in-person mentorship. Programs A and B, with limited director presence, highlighted the vital role of local coordinators but also showed that faculty engagement – especially in person – enhances student adaptation, confidence, and reflective learning in unfamiliar environments.

#### 4.6.4. Cultural immersion and location

Each program's geographic and cultural setting played a pivotal role in shaping participants' understanding of diverse societies and their capacity to operate thoughtfully and professionally across cultural boundaries. The location was an active component of the learning experience that influenced the depth and nature of intercultural engagement.

Program A, situated in Western Europe, prioritized immersion into the region's rich cultural landscape. Structured living arrangements allowed students to experience the rhythms of daily life alongside locals, creating organic opportunities for cultural exchange. Whether shopping at neighborhood markets, navigating public transportation, or attending community events, participants had regular, informal encounters that

deepened their understanding of European cultural traditions and social expectations. This setting enabled students to practice intercultural communication in real-world contexts, cultivating greater flexibility, cultural sensitivity, and an appreciation for diverse perspectives. The emphasis on long-term immersion also gave students the time to build relationships with host community members, moving beyond superficial tourist interactions toward more meaningful connections.

Program B, based in a technologically advanced Asian country, leveraged its dynamic environment to enhance both cultural learning and technical development. Organized cultural excursions, including visits to local historical landmarks, traditional workshops, and bustling marketplaces, provided a rich counterbalance to the program's engineering focus. The program's urban, fast-paced setting underscored the interplay between tradition and modernization, allowing students to appreciate cultural resilience and innovation. By engaging with diverse cultural practices against a backdrop of rapid technological progress, participants not only broadened their global awareness but also learned to adapt their professional skills to different cultural contexts. This dual focus on cultural exploration and engineering practice encouraged students to appreciate the value of diverse worldviews and equipped them to navigate intercultural collaboration with greater confidence.

Program C, conducted in a resource-limited community, was grounded in hands-on cultural immersion driven by real-world needs. Here, cultural understanding arose naturally as students worked alongside local community organizations to tackle engineering challenges. Direct exposure to local customs, economic realities, and traditional knowledge systems invited students to appreciate community resilience and creative problem-solving. Participants learned to recognize that engineering solutions must be co-created with the people they serve, demonstrating empathy and humility as they adapted their technical expertise to fit local priorities. In this immersive context, cultural awareness went hand-in-hand with ethical practice, reinforcing students' sense of responsibility to work with, rather than for, local communities.

Each program created opportunities for students to engage thoughtfully with their surroundings, though the emphasis and structure of these engagements differed. Program A fostered gradual, everyday immersion that cultivated cultural awareness and personal adaptability; Program B blended cultural learning with visits to historical and cultural sites, reinforcing students' capacity for cross-cultural problem-solving in fast-evolving settings; and

Program C highlighted participatory collaboration, allowing cultural sensitivity and social responsibility to emerge from sustained community partnerships.

Together, these programs illustrate that the richness of cultural immersion is shaped as much by program design as by location. Whether through sustained daily contact, guided excursions, or service-oriented projects, all three programs enabled students to navigate new cultural landscapes and appreciate the diverse contexts in which engineering and innovation take place. This multifaceted exposure to different traditions, communication styles, and social priorities ultimately equipped students with a deeper, more nuanced understanding of global perspectives and the ability to adapt their professional practice across cultural boundaries.

#### 4.6.5. Academic content

Program A's strong academic component was central to deepening participants' intercultural learning and preparing them to navigate global work environments. The Global Culture class introduced core concepts of intercultural communication—essential for succeeding in diverse professional settings—and equipped students with practical strategies for bridging cultural differences. Participants directly applied these strategies in their internships, enriching their work experiences and developing long-term intercultural skills.

By emphasizing intercultural competence, Program A supported students' professional growth, helping them manage complex social and professional interactions in international teams. Practicing these skills in real-world contexts boosted their confidence and fostered openness, flexibility, and cultural sensitivity. The class also encouraged students to recognize diversity as a strength in collaborative global engineering, preparing them to contribute thoughtfully and empathetically in international settings.

This strong academic framework underscores the value of structured intercultural training in experiential programs. By combining technical skills with deep cultural reflection, Program A ensured students were both technically prepared and globally aware.

In contrast, Program B incorporated some intercultural reflection – such as assignment prompts about local food culture – but lacked the structured reflection found in Program A. These prompts provided opportunities for students to consider the deeper cultural meanings behind local cuisine and its role in society, fostering greater cultural awareness and appreciation even in a more informal or limited academic context. However, without sustained

academic engagement with intercultural topics, students' reflections remained more superficial.

Program C, meanwhile, promoted cultural learning mostly through hands-on community engagement projects rather than formal academic content. Without a dedicated global culture course, students relied on practical exposure rather than structured theory to support their intercultural development. Together, these differences highlight the important role academic content can play in fostering deeper, more meaningful intercultural learning.

#### 4.6.6. Program duration

The length of each program can play a role in shaping students' experiences and learning outcomes. The time students spent abroad directly influenced the depth of their cultural immersion, professional adaptation, and personal growth, with each program's duration carefully aligned to its goals and structure.

Program A, the longest at 10 weeks, offered students sustained opportunities for deep professional and cultural engagement. Its extended timeframe enabled participants to complete individualized internships and the Global Culture course, allowing them to gradually adapt to the host culture and build intercultural competence. One participant noted that having several weeks in the host environment gave them a nuanced understanding of local customs, which improved their communication and collaboration skills. The longer duration provided ample time to strengthen both discipline-specific expertise and global awareness — an outcome supported by literature suggesting that extended programs lead to deeper cultural integration.

Program B lasted about 8 weeks and balanced technical skill-building with intercultural exposure. Its moderate length gave students sufficient time to rotate between independent work and team-based engineering projects in a high-tech setting. Participant B5 reflected that eight weeks felt “just enough” to gain practical experience and explore teamwork across cultures. However, compared to Program A, the slightly shorter timeframe limited opportunities for sustained cultural immersion, and students relied more on structured cultural activities to build their global outlook. Even so, the program's hybrid model successfully supported skill development and fostered adaptability without overwhelming early-career participants.

Program C, at approximately 7 weeks, was the shortest and most concentrated. Designed for students to make a direct impact on community-

centered projects, the program prioritized immediate cultural and social engagement. Participants had to quickly adjust to local practices and apply their engineering expertise in resource-limited contexts. Participant C2 described the experience as highly immersive despite its brevity, noting that the intensity of the work and close collaboration with local partners provided meaningful lessons in culturally responsive engineering. Though limited in length, Program C successfully promoted empathy and social responsibility, aligning with research indicating that short-term, well-structured programs can have substantial impact.

These findings echo existing literature, which acknowledges that while longer programs often offer deeper cultural immersion, thoughtful design can make short-term programs equally transformative. Donnelly-Smith (2009) suggests that the program's structure is more important than its length, and research by Fisher et al. (2022) and Stebleton et al. (2015) supports the view that focused short-term programs can foster significant intercultural learning when they incorporate targeted activities and guided reflection. Similarly, Dwyer and Peters (2004) conclude that condensed, strategically designed programs can yield high-impact outcomes, as demonstrated by participants' growth across all three programs.

Among these three programs, individualized industry placements (Program A) appeared to support clearer discipline-specific career clarification, collaborative internship structures (Program B) supported early professional skill development and adaptability, and community-based projects with sustained faculty mentorship (Program C) supported ethical awareness and reflection on engineering's societal role. Because this exploratory qualitative study was not designed to measure the extent of these outcomes, these observations reflect patterns in participant experiences rather than definitive conclusions about program effectiveness. Nevertheless, they suggest that specific program elements may shape different dimensions of global competence and career readiness.

## **5. Discussion**

The findings of this study suggest that faculty-led internship abroad programs can support engineering students' development of global competence, professional skills, and personal growth when intentionally designed. However, the nature and emphasis of these outcomes varied across the three program models. Program A, which provided individualized, discipline-aligned

placements, most strongly supported career clarification and technical skill application, as students engaged directly with professional engineers in structured workplace environments. In contrast, the hybrid and collaborative structure of Program B emphasized teamwork, adaptability, and early-career skill exploration, particularly for younger students with limited prior internship experience. Program C, which centered on community-based engineering projects and sustained faculty mentorship, most strongly fostered ethical awareness, social responsibility, and reflection on the societal role of engineering.

Rather than producing identical outcomes, each program model emphasized different dimensions of student development. Programs with structured coursework and reflection components appeared to facilitate deeper articulation of intercultural learning, while programs emphasizing community engagement fostered greater awareness of engineering's social impact. These findings suggest that program design—not simply international location—plays a critical role in shaping the types of learning outcomes students experience.

These results align with prior research emphasizing the role of global learning in preparing students for success in an increasingly interconnected world (Hovland, 2009; Landorf & Doscher, 2023). However, this study extends the conversation by demonstrating how faculty-led internship abroad programs provide an integrated platform for developing global competence in ways that differ from traditional classroom-based study abroad models.

One of the most striking findings was the interplay between professional development and intercultural learning. Participants not only developed technical skills through their internship placements but also described the process of learning to navigate unfamiliar professional cultures and communication styles. This supports the argument made by Downey et al. (2006) and Jesiek et al. (2014) that global competence in engineering is best developed through authentic, situated practice rather than abstract instruction. Working within international teams provided students with opportunities to confront ambiguity, negotiate differences, and develop cultural self-awareness – all of which are essential competencies for engineers operating in global contexts.

Another important theme was the development of global perspective and social responsibility. Students' reflections indicated that their engagement with local communities, exposure to international engineering practices, and discussions of ethical and cultural dimensions of their work contributed to a broader understanding of the global context in which engineering solutions are

applied. This aspect of the findings parallels ongoing conversations in engineering education that emphasize the need for graduates to not only be technically proficient but socially aware and ethically grounded (NAE, 2004; Parkinson, 2009).

Taken together, the results of this study suggest that faculty-led internship abroad programs represent a promising and underutilized pathway for supporting global learning and professional development in engineering education. These programs offer a distinctive model that responds to some of the logistical and curricular barriers that have traditionally limited engineering students' participation in study abroad, while simultaneously advancing institutional goals for global learning and preparing students for the demands of an international workforce.

### 5.1. Limitations

This study has several limitations that should be considered when interpreting the findings. First, the analysis was based on three faculty-led internship abroad programs at a single institution and a relatively small sample of fourteen participants. While the multi-case design allowed for in-depth examination of student experiences, the findings are not intended to be broadly generalizable to all engineering internship abroad programs. Instead, they provide insight into how specific program elements shaped student learning within these contexts.

Second, participation in post-program interviews was voluntary, which may have resulted in self-selection bias, as students with particularly meaningful experiences may have been more likely to participate. Another limitation is that this study identified the presence of learning outcomes but did not measure their depth or magnitude. While participants described developing skills such as intercultural communication, adaptability, and technical competence, the qualitative design does not allow for assessment of the extent to which these skills developed or how they compare across programs. Quantitative or mixed-methods studies using validated assessment tools would be needed to measure changes in global competence and professional skills and to determine how specific program elements influence the degree of student learning. Because this study examined only three cases at a single institution, the findings should be interpreted as context-specific rather than broadly generalizable.

## 5.2. Implications for practice

The findings of this study can offer important insights for faculty, administrators, and international education practitioners seeking to enhance global learning opportunities for engineering students. Faculty-led internship abroad programs represent a flexible and impactful model for integrating intercultural learning, professional development, and academic coursework – particularly for student populations that are traditionally underrepresented in study abroad, such as those in engineering and other STEM disciplines.

The findings suggest that combining cultural immersion with real-world engineering practice produces a unique context for student growth. Students learned not only from formal coursework and internship tasks but also from their lived experiences in unfamiliar cultural environments. Program designers should aim to create opportunities for students to engage meaningfully with local cultures, both in the workplace and beyond, through community-based activities, professional networking, and facilitated cultural reflection.

Finally, the structure of internship abroad programs offers a strategic solution to common barriers that limit engineering students' participation in global education. Programs that align internships with academic credit, fit within summer schedules, and are embedded within faculty-supported cohorts allow students to gain international experience without delaying graduation while still allowing students to gain relevant professional experience aligned with their academic and career goals.

By leveraging these insights, educators and administrators can design faculty-led internship abroad programs that not only enhance students' technical skills but also foster the global competence, adaptability, and intercultural communication skills increasingly demanded by the engineering profession.

## 6. Conclusion

This exploratory case study examined how faculty-led internship abroad programs contributed to engineering students' academic, personal, and professional development. Among these three programs, students described experiences related to career exploration, technical skill development, intercultural adaptation, personal growth, and global perspective development. While the presence of these outcomes was consistent across the cases, the ways in which students experienced them varied depending on program structure

and context. These findings suggest that faculty-led internship abroad programs can provide meaningful opportunities for integrating professional experience with global learning, while also highlighting the need for further research to understand the depth and comparative impact of different program models.

Throughout the three cases, students described experiences that showed growth across five interconnected areas: career exploration, the development of engineering and professional skills, adaptation to new work environments, personal growth, and an evolving understanding of global perspectives. While the depth and character of these outcomes varied by individual and program, the consistency of these themes across cases represent a promising model of integrating academic coursework, international internships, and faculty mentorship.

This study highlights the value of intentionally designed programs that move beyond traditional study abroad models, particularly for students in fields like engineering, where global learning is often underemphasized or logistically difficult to access. By embedding professional work placements within faculty-led global programs, institutions can create conditions for authentic engagement with both the technical and human dimensions of global engineering practice.

As institutions and educators consider ways to better prepare students for global careers, faculty-led internship abroad programs offer a promising model. These experiences provide space for students to connect theory to practice, reflect on their own development, and develop the intercultural agility that is increasingly vital in a globalized workforce.

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