Perspective on the "Return on Investment" for Global Engineering Experiences

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Perspective on the "Return on Investment" for Global Engineering Experiences

Abstract

This paper investigates the perceived costs and benefits of global engineering experiences in a university setting, focusing on the tangible and intangible outcomes that study-abroad opportunities provide for engineering students. The paper also reviews current students' perspectives on questions related to global opportunities to inform continuous program improvement in universities and to guide messaging that builds interest among future study abroad participants in the engineering fields.

The literature review examines the relationship between the initial investments required of both students and universities to participate in global engineering experiences and the subsequent professional and personal benefits developed. Upfront costs often include financial expenditures, potential extensions in degree completion, and additional preparation for international engagement, such as basic language training, immunizations, course scheduling, and travel logistics. However, the benefits of global experiences are extensive. Students who participate in international coursework, humanitarian projects like *Engineers Without Borders*, or global industry internships often report enhanced career readiness, stronger communication and problem-solving skills, and greater adaptability in diverse environments. These experiences also foster professional growth by expanding global networks, enhancing leadership skills, strengthening professional skills, and improving competitiveness in the job market.

To evaluate these outcomes, this paper integrates both quantitative and qualitative findings from existing research and a current student survey. Ultimately, this paper aims to provide insights for universities seeking to strengthen the impact and accessibility of global engineering programs. The findings may help highlight strategies to maximize institutional resources, guide thoughtful program selection, and develop effective communication to encourage greater student participation in study abroad experiences.

Introduction

As the world becomes increasingly connected and global experiences become more popular, universities must develop curricula that better promote and highlight these international opportunities. Study abroad programs, which can be anywhere from short-term faculty-led experiences to semester-long exchanges or immersive international internships, are commonly marketed as more than an educational journey; they are framed as a trip that broadens students' cultural horizons, increases their global competency, strengthens their academic knowledge, and enhances professional readiness. These programs are widely thought to help in developing

students' adaptability, intercultural competence, global awareness, and even improved career pathways. Through coursework, projects, and cultural experiences, engineering students transform into globally competent leaders [1-3]. However, a question remains: How significant are these programs in shaping a student's academic and professional development?

Despite their benefits, study abroad experiences are not just experiences one can pick based on where they want to travel. The costs of travel, program expenses, and other non-covered living expenses can pose a substantial financial barrier for students and their families. Beyond cost, students may also express concerns about time away from home, navigating unfamiliar cultures, balancing demanding academic degrees, rigid coursework, and the uncertainty about whether the experience will yield a clear positive return on investment (ROI). These hesitations and concerns showcase an immense gap between the perceived value of study abroad and the measurable outcomes that students and universities expect from such programs.

This literature review and accompanying survey examine the documented and perceived costs and benefits of study abroad programs, incorporating firsthand accounts from university students to create an idea of the perceived ROI of study abroad experiences. This paper clarifies how study abroad programs influence personal, academic, and professional development, with particular emphasis on engineering students, who often face distinct curricular constraints but operate in an ever-globalizing industry. By highlighting the significant benefits of study abroad for students' long-term professional careers, participation in these programs may increase. If current students acknowledge how international learning has aided past students in the university, then they will be more likely to investigate and research potential study abroad programs that might fit their schedule. Likewise, the research provides insights for universities seeking to modify their curricula and motivates student participation in future global engagement programs. The overall goal is to give the universities insight into students' diverse perspectives on the feasibility of study abroad programs, enabling them to modify their curricula to better support these experiences.

Literature Review

In engineering education, greater emphasis has been placed on preparing students not only to develop technical skills but also to succeed in diverse, multicultural team environments. Through extensive challenging coursework and technical projects, engineering students must learn to think critically to solve complex challenges that impact a community, thereby developing problem-solving skills. However, research suggests that communication skills and global competence are as necessary as technical skills for engineers to excel in the workplace and to develop interpersonal relationships [3-4].

As engineering graduates enter a workforce that values collaboration, adaptability, and global awareness, study abroad programs can serve as a university's mechanism for developing these capabilities [3]. While existing research highlights a mix of personal, academic, professional, and institutional outcomes associated with participation in global experiences, and many studies report a positive ROI (particularly in the areas of professional skill development, degree completion, and career readiness), other work raises questions about the consistency of measurable economic benefits; thus, highlighting ongoing barriers such as financial costs and rigid curricular structures [5-8]. Our goal is not only to discuss these ideas but also to incorporate firsthand accounts of current students to strengthen the credibility of the ROI. Through a literature review and our own academic survey, we will assess the costs and benefits of international experiences and evaluate their impact on a student's educational journey.

Career and Employability Outcomes

Students who study abroad participate in a meaningful, engaging learning experience outside the classroom that influences their educational and career trajectories. Research indicates that career value clearly influences whether students will participate in study abroad programs [9]. Although a good GPA influences employability outcomes for engineering students, communication, time management, and leadership skills play a greater role in their success. These may be acquired through leadership positions in student organizations or clubs, internship or co-op opportunities, research experience, or study abroad programs. However, the underlying question remains, "How can engineering students become better and more competitive candidates for employers by participating in international experiences?"

Global experiences directly affect career and employability outcomes for engineering students by providing ample opportunities for teamwork and leadership that can be highlighted in interviews or at career fairs [3]. Although most of the research findings apply to college students in general, they support the paper's overall aim by demonstrating that studying abroad is directly linked to career choices and employment opportunities across different majors. Based on the literature, several key benefits emerge for students seeking employment after participating in international experiences.

Professional Development

One of the main findings was that education abroad provides students with the opportunity to build a life in a completely new environment, adapting to language barriers and collaborating with peers in order to solve complex challenges and develop their professional skills. These experiences enhance adaptability, time management, and problem-solving skills, all of which are essential in careers [10].

The Institute for the International Education of Students (IES) conducted a longitudinal survey of 17,000 alumni who had participated in study abroad programs between 1950 and 1999. The survey conducted in 2002 indicates that participants continue to benefit from their international experiences, especially in their careers [5]. The study highlights how education abroad has drastically changed throughout the decades, yet one thing still remains the same: students continue to transform into global, educated leaders after participating in these meaningful programs.

Additional research reinforces these findings for engineering students in particular. Research conducted by the Institute of International Education for the National Science Foundation with alumni of the Global Engineering Education Exchange (E^3) program found that global experiences play an essential role in students' professional careers. Additional survey results showed that 69% of respondents believed their global experiences increased their passion for their careers, while 66% believed it made them more competitive candidates to employers [10].

A separate study was done at UC Santa Barbara by professionals who aimed to highlight the benefits of studying abroad for all undergraduate students. Although the paper focused on all majors, the authors emphasized the claim that engineering students have much to gain from international experiences. The quantitative data acquired from this paper further reinforces the idea that students across cultures are more likely to improve their professional skills after participating in a global experience. As presented in Table 1, among 143 respondents, the category mean for "impact on professional development" was close to 4 (agree) at 3.95, while the statement "Because of study abroad, I will feel comfortable working internationally" scored even higher at 4.34, showcasing how strong the relationship between global experiences and career development is [8]. Further, the lowest mean score, "Study abroad will help me in my search for my first job after graduation," (3.42), suggests a more indirect and unclear but still positive influence of the perceived impact of study abroad on employment outcomes [8].

Employer Perceptions and Hiring

Dweyer's article on the 2002 IES study highlights the responses of 3,700 alumni who participated in a study abroad program between 1950 and 1999. Regarding career impact, 76% of alumni reported that skills acquired while studying abroad influenced their careers [5]. Another IES Abroad survey, titled "Recent Graduates Survey," was conducted in March 2012 to understand the overall impact study abroad programs have on recent graduates' careers. The survey was sent to alumni who had participated in an IES Abroad program from 2004 to 2011, and who had also graduated between 2006 and 2011. From a pool of 1,008 responses, 84% of the survey respondents believed that their international experiences truly allowed them to build essential job skills, of which 88% detailed the experience as "effective" or "very effective" in helping them do so [12]. These results highlight the vast impact that studying abroad

opportunities have on students' career development. Likewise, IIE carried out a survey to examine the impact of studying abroad on engineering careers, collecting responses from 40 engineering graduates who participated in the Global Engineering Education Exchange (Global E³) program, the largest consortium for engineering study abroad. In this survey, 70% or more of the respondents believed that studying abroad enhances the professional skills required by the Accreditation Board of Engineering and Technology (ABET) and industry [10].

Table 1. Participants' views on the relationship between study abroad and professional development [8]

Impact on Professional Development: To What Extent Do You Agree with the Following Statements about Studying Abroad? (n = 143)	*M*	*SD*
Because of study abroad, I will feel comfortable working internationally.	4.34	0.81
Study abroad is important to my professional development.	4.13	0.91
Study abroad will enhance my lifelong career opportunities.	3.90	1.06
Study abroad will help me in my search for my first job after graduation.	3.42	1.16
Category Mean	3.95	

Note. Likert scale response: 5 = strongly agree, 4 = agree, 3 = neither agree nor disagree, 2 = disagree, 1 = strongly disagree

Other studies also explore employer perceptions. Troobooff et al. participated in an important study related to employer attitudes toward education abroad, in which employers were asked to rank the importance of education abroad in students' educational journeys [11]. Results indicated that the academic major was the most valued asset, yet another noteworthy result is that senior managers ranked study abroad higher than internships. This finding suggests that employers regard international experiences as a way for students to become independent and globally competent.

Additionally, by accepting the challenge of participating in an international program, employers may appreciate students' willingness and curiosity to communicate and engage with individuals from diverse cultures and perspectives. Engineers must understand global ideas and learn about design processes all around the world to address challenges that may arise from different projects or scenarios. This idea can lead to engineering students developing improved adaptability to

diverse environments, as global experiences teach students to step out of their comfort zones by engaging in unfamiliar environments that may always work out. Employers value students who face adversity with courage and tackle problems with confidence. Engineering graduates receive extensive onboarding training before fully integrating into the company [14-15]. To excel in a fast-paced environment, they must demonstrate adaptability, patience, and determination.

International Career Aspirations

Engineers in global programs can also build professional networks and make new connections that have the potential of becoming professional contacts in the future. Students have the opportunity to engage with the local community, as well as get to know their engineering peers, which increases global perspective and diversity. Employers value students who have the ability to build interpersonal relationships, communicate with international teams, and manage difficult conversations. Hence, building broader professional networks influences career opportunities, as well as personal development.

Studies strictly related to engineering students reinforce this trend. Bettez and Lineberry assessed how study abroad experiences clearly aligned with ABET professional skills. The results highlighted that five out of six students reported an increased interest in pursuing an engineering career in a multinational corporation after their global experience [9]. Similarly, interviews with eleven undergraduate engineering students showcased that study abroad experiences helped clarify their future career plans, impacted the way they view their future, increased their appeal to employers, and strengthened their interest in working internationally [9].

Further, universities around the world have developed programs to intentionally connect engineering study abroad with global career preparation. Research has found that exposing engineering students to multicultural settings during their time at college serves as a key element that will influence their professional careers and mirrors the dynamics they will find in industry [9].

Employment Outcomes

Furthermore, research suggests that students who have participated in study abroad programs tend to find employment faster than those who do not [5], [12]. Programs like the IES Abroad, which allow students to participate in global learning opportunities, provide data highlighting the impact of these programs on their job-seeking process. A study suggests that 50% of alumni believed that their IES Abroad program opportunity allowed them to get their first job [5]. Another IES Abroad study showcases that 89% of the survey respondents received their first job within 6 months of graduation, with almost half receiving it while still in school [12]. While these studies include graduates from various majors, the findings are broadly relevant to

engineering students because, through job fairs and interviews, they may highlight the variety of skills acquired through their programs, thus increasing chances of employment.

Study-abroad participants were also found to earn more in their first post-graduation job [12]. While this data pertains to graduates across a variety of majors and countries and is not specific to engineering, the underlying takeaway is generalizable. Employers value candidates with international experience because they bring a wide range of diverse perspectives, ideas, and problem-solving skills. For engineering students, who often enter global environments, these experiences can help them stand out from a competitive pool of candidates, particularly in international roles.

Lastly, research highlights that global experiences provide students with greater employment opportunities and improved admission to graduate and professional school programs. The wide range of global competencies acquired through these experiences equips students with the necessary skills that appeal to recruiters and admissions committees. Although research suggests that studying abroad is not a direct link to getting a position in industry, the experiences and skills learned become apparent during interviews, thus setting the candidate apart from the other applicants. In the IIE research, one respondent highlighted, “my experiences through Global E^3 have given me many answers to questions in interviews” [9].

Finally, an IES Abroad study highlights that 76% of students who participated in international experiences got into their first-choice graduate school, and another 14% got accepted into their second-choice school. Admissions officers typically regard students who study abroad as ambitious, curious, and globally minded candidates who will apply these highly valued skills in their respective programs [3, 12].

Academic and Institutional Benefits

Study abroad experiences may provide ample academic advantages that most engineering students cannot access through traditional coursework alone. Several studies indicate that global programs aid students in developing stronger academic habits, broaden their perspectives, and improve degree completion outcomes [10, 20].

On the academic side, students who go abroad report more engaged learning and a stronger sense of educational purpose. A large-scale study found that generally, students who studied abroad graduated at higher rates than their on-campus peers [20]. These patterns suggest that these experiences may impact students’ career journey, functioning as an academic support mechanism.

The quality of academic learning also improves when students go abroad. Research shows that longer global programs often lead to a more developed cultural and academic outlook, and that

students with higher GPAs report greater overall academic benefits [10]. Global exposure can push students to think more broadly about engineering work, as it allows them to experience first-hand the specific technologies, sustainability practices, etc. that prevail in the diverse countries visited.

Institutions also benefit from education abroad programs. Alum surveys from the Institute for the International Education of Students (IES) and the American Institute for Foreign Study (AIFS) demonstrate long-term academic and personal impact. 84% of alums reported strengthened career-related professional skills, and a significant share claims that their study abroad experience directly influenced their college choice or future academic decisions [16-17]. As a consequence, stronger alum engagement and stronger student outcomes improve the institution's academic reputation by enhancing students' development.

There are also structural benefits for universities. A Department of Education analysis found that sending students abroad can reduce demand on faculty, classroom space, residence halls, and student services, thereby generating savings across multiple areas [19]. This implies that global programs can relieve pressure on campus resources. Institutions that reinvest these savings into scholarships or program development for engineering students of all different backgrounds can further expand access and accessibility.

Study abroad contributes to institutional diversity and inclusion goals. Students who participate tend to develop more diverse social networks, greater cultural awareness, increased empathy, and stronger global mindsets [15-16]. These outcomes enhance the learning environment, especially in engineering programs where cross-cultural teamwork is increasingly crucial to professional practice. Understanding how different cultures interact may prove useful for engineering professionals to effectively collaborate across cultures, adapt in challenging environments, and lead diverse teams.

All in all, these academic and institutional benefits highlight that study abroad programs are meaningful experiences that strengthen student learning and support broader university goals. For engineering students who must often collaborate across borders and navigate diverse technical standards, these experiences closely align with the academic competencies required for global practice.

Financial and Institutional ROI

For many college students, particularly in engineering, the decision to study abroad is decided not only by interest in their program's destination and its courses, but also by financial and academic considerations. While study abroad opportunities promise personal and cultural enrichment and academic growth, many are still left wondering if the initial financial commitment required is truly worth the experience. Study abroad programs often entail high

upfront costs, including travel, housing, program fees, and other miscellaneous expenses while in the host country. These cost barriers can frequently discourage participation from students of all backgrounds. Not to mention additional expenses at the new location, such as food, activities, souvenirs, and unexpected costs, also add to this financial strain. These entry costs can frequently discourage participation or outright prevent it. However, when student outcomes and institutional returns are considered, studying abroad becomes a meaningful investment for both students and universities rather than merely a short-term cultural benefit for the individual.

According to Inside Higher Ed, study abroad costs vary widely, with the largest share of students (44%) spending between $5,000 and $10,000 and some exceeding $15,000, depending on the program [6]. Beyond direct expenses, students and institutions must consider additional opportunity costs such as delayed graduation, missed internships, reduced short-term earnings, and valuable time away from family. These barriers often lead students to question whether the experience abroad is truly worth it. However, because relatively few engineering students study abroad, those who do gain a competitive advantage by differentiating themselves in the job market, which positively reflects back on the student, allowing them to gain an advantage over their peers. Likewise, the universities with larger alumni networks within the job market allow for a competitive edge when coming from certain universities, possibly attracting the attention of incoming applicants [2, 7, 21, 23].

Long-term data on wages and employability also suggest that study abroad programs can offer positive returns on wages. One study reports a positive correlation between studying abroad and wage increases of approximately 3–5% [18]. While small, this increase indicates that employers value the global competencies and skills gained through international experience. Likewise, even small salary increases compound, indicating that international experiences contribute to sustained financial growth within one's profession rather than to short-term cultural gain. This is relevant for engineering students, as demonstrating a positive return on investment enables them and their universities to justify the cost of studying abroad as well as other potential opportunity costs. These findings suggest that although the financial benefits may not be immediate, students who study abroad often emerge better positioned for long-term career success.

Along with the salary increase, international experience also facilitates upward career mobility. The NACTA Journal notes that although many entry-level positions do not explicitly require international experience, these skills become increasingly valuable at mid-career stages, when leadership, cultural awareness, cross-cultural communication, and adaptability are more important in the job and promotion markets [13]. Student perceptions also indicate long-term benefits beyond immediate financial outcomes, as research abroad consistently links study abroad participation to improved professional skills such as communication, adaptability, and leadership [10, 12, 14]. Data from an alumni survey indicate similar findings, with 84% of IES Abroad alumni reporting improved job-related skills. Likewise, among those who decided to

pursue graduate school, 90% reported that it helped them secure admission to their preferred graduate program. So even if the wage bump is initially limited, studying abroad contributes to a more rounded individual, allowing them to compete for more competitive positioning and long-term professional mobility, enabling better positions, more connections, higher pay, or greater flexibility within one's job [16].

This helps support the idea that, due to increased, gradual financial improvements, tied to higher graduation rates and stronger, more successful alumni even if the college itself does not get a higher return on a monetary investment, the opportunities it helps give its students come back in a positive return on investment in creating a stronger alum network and a more worldly institutional connection.

Findings and Student Survey

Study Abroad Survey

Through the above literature review, we wanted to understand the impact study abroad has on students' academic and career journeys, independent of the institution they attended. As we felt it could be insightful to compare current engineering student perspectives to our findings, we surveyed students at the Pennsylvania State University. While this was a student survey and not a formal research study, we approached the development of the questions by considering topics that emerged in the literature, as well as those we felt would resonate with our student peers. Questions included subjects such as study abroad opportunities, motivation to go abroad, and financial barriers. In the section below, we discuss takeaways from the literature as they compared to this exploratory survey, which collected the impressions of both participants and non-participants of the study abroad. It was distributed to students through convenience sampling (in classes, clubs, word of mouth, and one-to-one contacts) to gather student impressions. These current student perspectives are discussed within the context of the literature and reviewed for exploratory purposes (gathering the student pulse informally, as one might in a peer-to-peer parley). Note that the survey and the broader paper were conducted by students enrolled in the Global Engineering Fellows class (STS 313) at the Pennsylvania State University as an optional academic enrichment opportunity. Two faculty mentors provided guidance, while the student team, consisting of 3 members, undertook the project.

Survey Results

The survey received a total of 44 responses from students representing a range of engineering disciplines, including mechanical, electrical, aerospace, biomedical, chemical, and computer engineering. Participants ranged from first-year students to several recent graduates (a proxy for current students). As seen in Figure 1, 65.8% of respondents reported having studied abroad or planning to do so; the remainder had not studied abroad. Interestingly, in the remaining 34.2%,

no one reported being uninterested in studying abroad; instead, they indicated that their course loads would not permit it. Among those who had studied abroad, programs ranged from short-term (less than four weeks) to semester-long, with most participants in four- to eight-week programs, indicating a preference for engineering summer study abroad programs. The reported costs ranged from $2,000 to more than $20,000, with many students reporting partial financial support through scholarships or institutional aid [24].

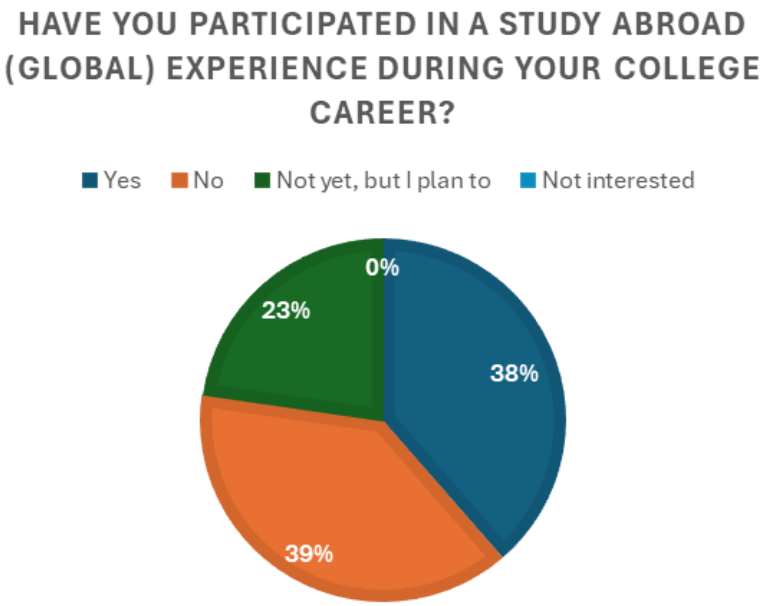

Figure 1: Results highlighting whether students participated in study abroad experiences

Summary of Findings

1. Academic and Skill Development:

While there is a positive correlation with study abroad experiences for engineers, contributing to the development of their academic and professional skills, particularly in communication, adaptability, and cultural awareness, this idea is supported by studies reporting that students who participated in international programs demonstrated increased global competence and improved problem-solving. These reports also indicated that immersive academic environments foster independence and flexibility, resulting in overall positive outcomes for program participants [3, 10, 12, 16, 22].

These literature review findings are closely aligned with the student survey. Across our questions, nearly all participants in a study abroad program reported substantial positive academic and personal growth. As seen in Figure 2, 94% of the student participants surveyed cited personal growth as one of their reasons for studying abroad. Likewise, all students who had already participated in an international experience reported that their study abroad positively affected their academic development, communication skills, adaptability, and cultural awareness, with cultural exposure cited as a primary reason for participating in these programs.

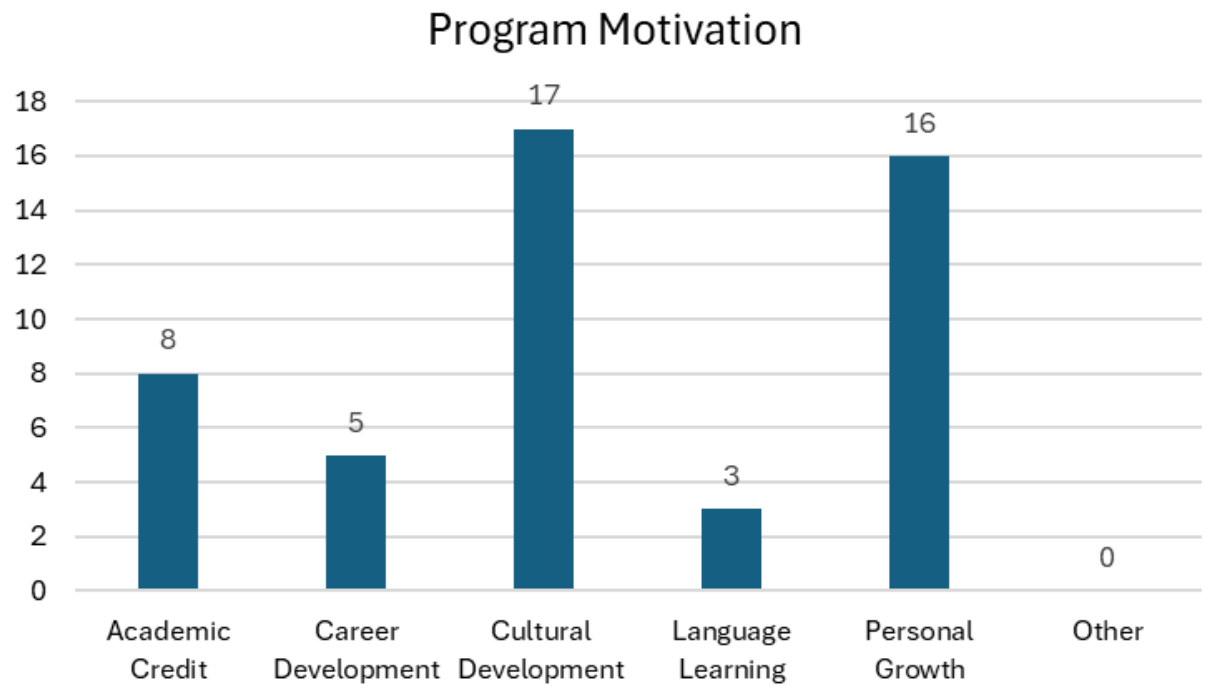

Figure 2: Results highlighting participants' motivation for studying abroad

Improvements in confidence and independence were also among the highest and most consistent in the survey, with those who had already studied abroad. Many students indicated that navigating unfamiliar cultural environments and academic systems strengthened their ability to problem solve and operate independently. The authors speculate that this may be related to the possibility that living in a different country may motivate changes in routine and lead to a more confident, resourceful, and attentive student by the end of the program. Likewise, these findings align with prior research showing the role of immersive experiences in developing global and transferable skills. Because personal growth is the second most common reason for studying abroad, after cultural experiences, this indicates that students seek to develop their global skills during their study abroad. This extends to students who have not yet studied abroad. This shows that students are interested in learning more about themselves and the country they will visit during their global experience, thereby highlighting their curiosity and eagerness to learn. This

extends to students who have not yet studied abroad, with nearly all responses (74.1%) indicating that "study abroad helps students gain valuable soft skills," as seen in Figure 3. These findings demonstrate that, consistent with prior research, engineering students not only experience these academic benefits but are also aware of their value, suggesting that an international experience impacts them when given the opportunity [3], [24].

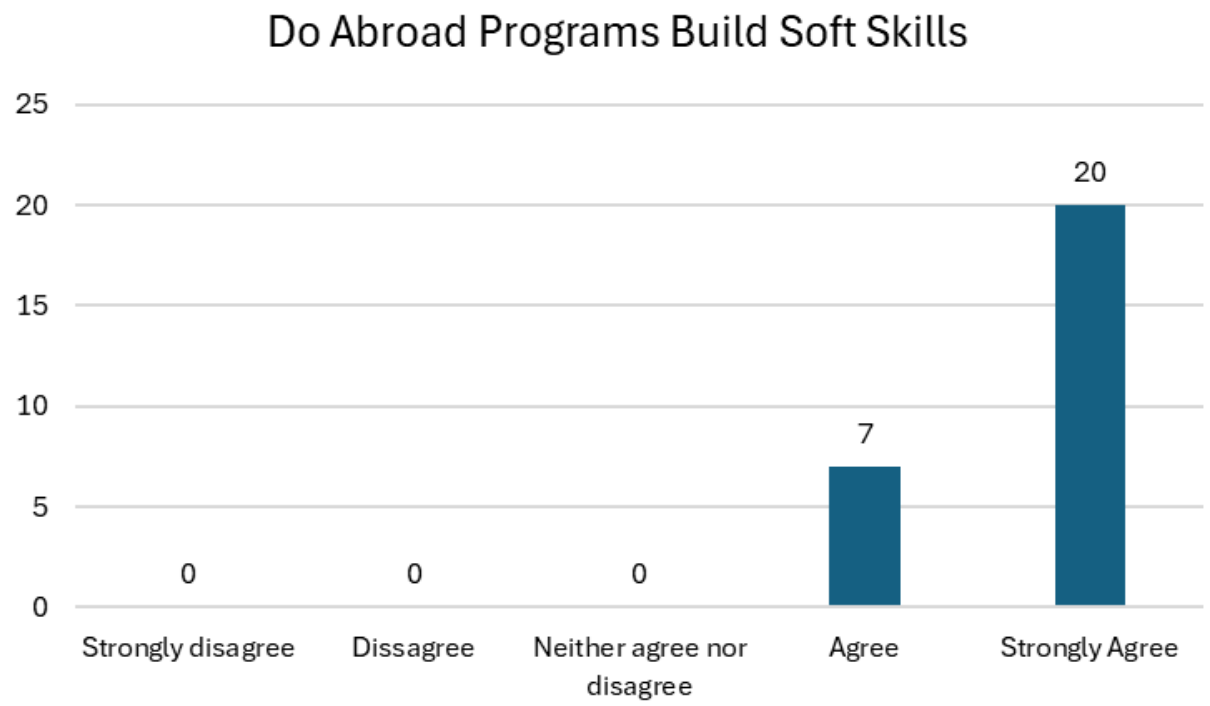

Figure 3: Past participants' beliefs on whether studying abroad influences professional skills

2. Career Readiness / Employability:

In the context of career readiness and employability, as discussed, studies have found that career benefits after a study abroad experience are often long-term rather than immediate. Likewise, short-term wage increases are generally limited by the availability of entry-level positions, while professional skills and mobility are usually enhanced. Alumni and job recruiters also reported that employers are increasingly valuing cross-cultural competence, adaptability, and communication skills, which engineering students can develop during their study abroad programs [11, 14, 15].

The survey indeed supports the idea that participation in study abroad positively influences career readiness. As evident in Figure 4, among students who have studied abroad, 88.2% agreed or strongly agreed that their experience improved their employability, with many noting

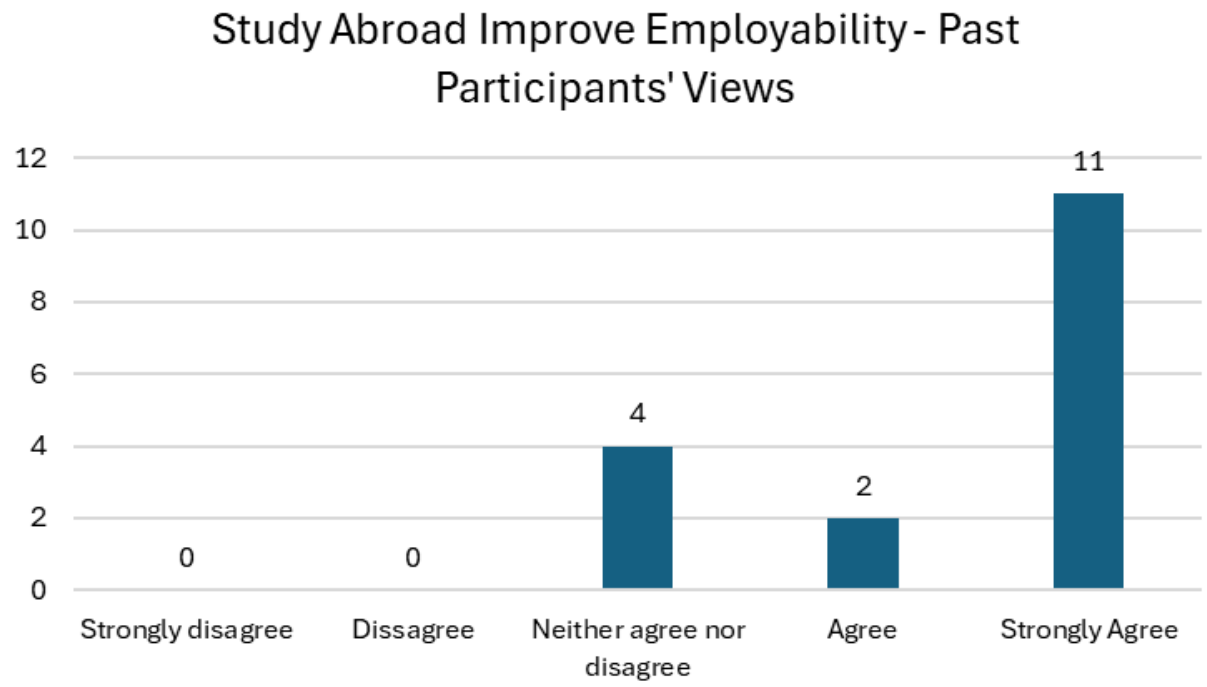

Figure 4: Past participants' perspectives on whether study abroad improved employability outcomes

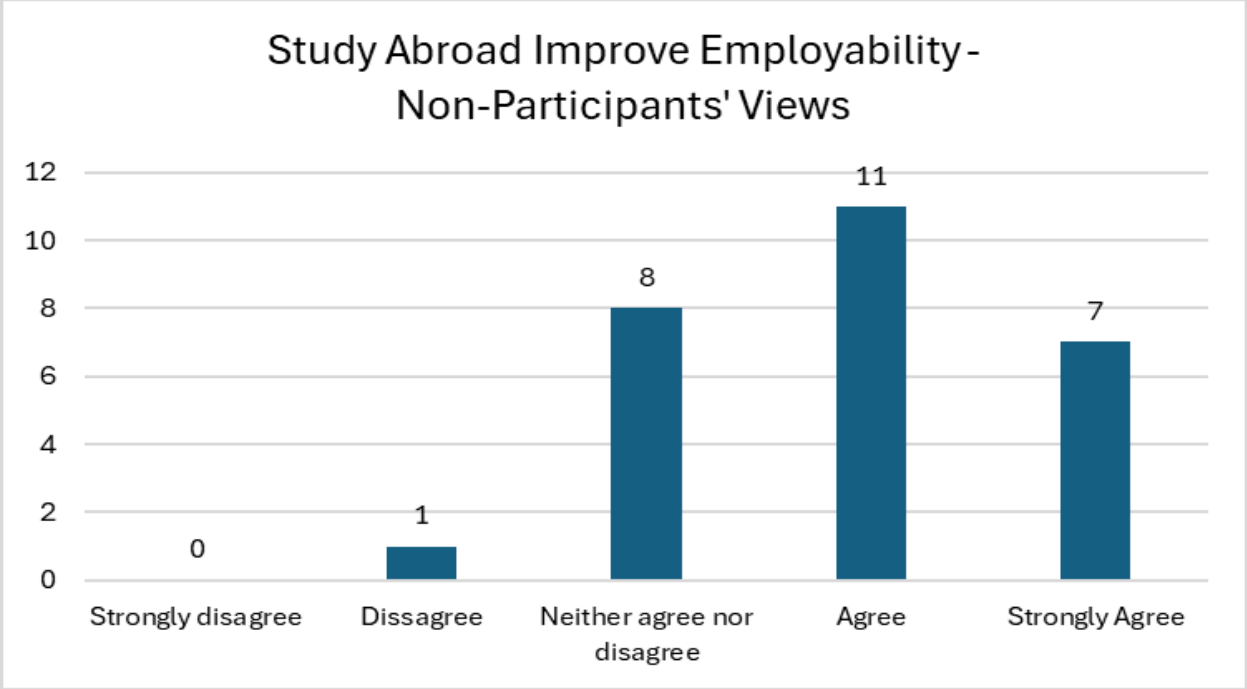

Figure 5: Non-participants' perspectives on whether study abroad would improve employability outcomes

enhanced communication skills, cross-cultural competence, and professional confidence. Likewise, as presented in Figure 5, among those who have not studied abroad yet, 69.2% believed that an abroad experience would benefit their career readiness, highlighting the perceived benefits of abroad programs for engineers [24].

While respondents were more divided on whether studying abroad directly increases short-term earning potential, most acknowledged long-term career benefits. This may indicate that students view international experiences as investments in professional growth rather than financial growth. However, it should be noted that career readiness ranked third and fourth in overall importance for studying abroad, suggesting that although students recognize that these abroad experiences can benefit their careers, they do not weigh their value solely on whether they would be hired for their future careers.

3. Financial Barriers:

Despite the benefits of study abroad programs for student engineers, financial and structural barriers (e.g., credit transfer windows and degree requirements) continue to limit their overall participation. National data indicate that cost remains one of the most significant obstacles when studying abroad, with over 80% of students citing financial concerns as their main reason for not participating [23]. In addition to the high entry cost, structural barriers that engineers face limit their involvement in these programs. Often, due to strict degree requirements or intense coursework, students must either delay graduation or forgo the opportunity to study abroad to graduate with their peers [7, 8, 20, 22]. The survey also strongly supports these claims. As evident in Figure 6, among students who had not studied abroad, 65.4% identified cost as a significant barrier, and 80% reported concerns regarding scheduling or credit transfer [24].

These results support the idea that engineering students lack the flexibility to study abroad, particularly for longer periods, due to their rigorous coursework and project-based courses. Additionally, several respondents expressed concerns about rigid degree requirements, including the risk of delayed graduation or difficulty integrating international coursework into tightly sequenced degree programs. These findings not only correlate with what is already known about barriers to entry for these programs but also highlight a disconnect between student interest and program accessibility, particularly within engineering curricula that offer limited flexibility. However, it is important to note that those who did not study abroad expressed interest in the programs, indicating the need to expand participation and program opportunities for engineers to not only increase their global awareness but also develop the professional skills valued in the job market. If universities take these students' claims into account, participation in these programs may increase, boosting the return on investment.

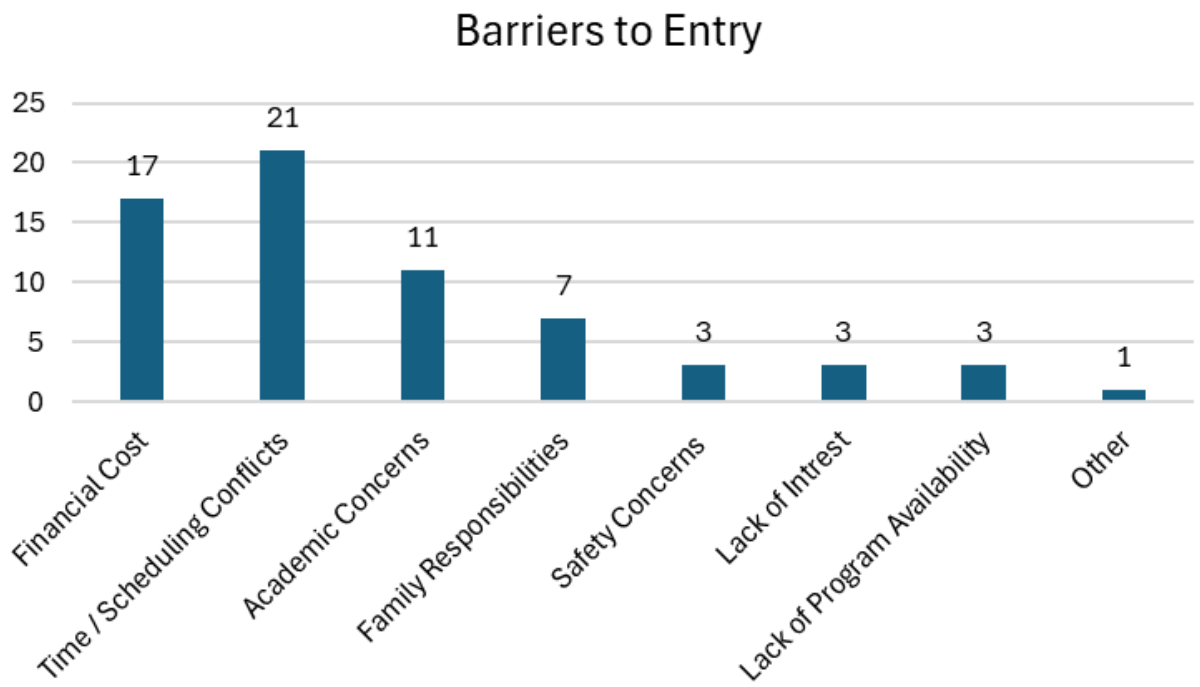

Figure 6: Non-participants' response to barriers to studying abroad

Summary and Limitations

Overall, the findings of the survey closely align with the ideas gathered from the literature review about the positive return on investment for engineers. While respondents and papers have recognized the educational and career value of international experiences, there still exist financial and curricular constraints for participation, showing the need for institutions to adopt strategies that significantly reduce these barriers, given the demonstrated return on investment and student interest. Thus, this survey, consistent with the literature, highlights that study abroad programs impact students' college experience, boost their career journeys, and influence personal beliefs as well. Hence, these opportunities serve as meaningful investments in college students, as they have a positive return on investment in student development and university curricula.

While our survey gathered current engineering student perspectives, it was an informal process with a small sample size. Questions were conceived with the literature and student perspectives in mind. However, they were not validated independently and did not employ formal methods. Despite these limitations, we believe its incorporation provided an opportunity to discuss whether our peer check-in was consistent with the articles we reviewed for this paper. Lastly, some of the literature was general to multiple academic disciplines, rather than entirely

engineering-focused. The overlap seemed sufficient to allow us to discuss the survey in the context of the literature reviewed, but it does not align completely.

Discussion

This paper identified evidence that global engineering experiences can provide meaningful returns on investment that may extend beyond immediate academic or financial outcomes. Rather than yielding short-term economic gains alone, studying abroad may constitute a sound investment, particularly for engineering students preparing to enter a globally connected industry. Likewise, both the survey responses and the existing research indicated a connection between international experiences and sustained career mobility, leadership development, and professional confidence over time [2, 14, 15, 18, 24].

In spite of the positive aspects a global experience provides, there is a gap between the perceived value of abroad programs and their accessibility to engineers. This gap may present an opportunity to build engineering student participation in study abroad. Students' responses overwhelmingly recognized the academic, professional, and personal benefits of a global experience. However, financial constraints and rigid curricular structures remained the most significant barriers to participation. This idea is especially relevant in engineering programs, where intensive credit semesters and tight degree schedules make it difficult for students to find the time or money to study abroad. As a result, the return on investment for engineering students may depend not only on the experience itself but also on the support they receive from their college.

Institutions could improve accessibility by embedding short-term abroad requirements within their engineering programs, or universities could consider creating partnerships with global universities and industries. These partnerships may help ensure curricular integration when studying abroad. Additionally, pathways to international internships might allow students to increase institutional visibility while building their global competence and developing engineering skills. From a financial perspective, expanding need-based aid, improving credit-transfer flexibility, and reinvesting institutional cost savings associated with education abroad into scholarships may further reduce participation barriers, allowing more students to study overseas, which could create higher workforce demand for those students, boosting the college's reputation [21, 22].

When engineering students participate in global programs, they learn essential skills such as communication, adaptability, teamwork, and cross-cultural awareness. Global opportunities act as an extension of professional engineering training, equipping students with skills that are

increasingly essential in multinational work environments and, overall, yielding a positive return on investment.

Conclusion

Overall, this paper demonstrated a positive return on investment for engineering abroad programs and global opportunities. However, there are still hurdles to entry, such as high costs and rigid degree requirements that may prevent students from participating in these programs. Through these abroad programs, engineering students enjoy long-term academic, professional, and personal benefits. Yet the gap between strong student interest, found in our survey, and limited curriculum compatible programs highlights a growing need for universities to reduce structural and financial barriers to entry to these programs. Ultimately, as institutions prioritize global engagement in their engineering students' education, stronger student outcomes, institutional reputation, and workforce preparedness may result. Hence, institutions should reinforce to their constituents and stakeholders the idea that study abroad has a positive return on investment beyond its perception as an optional personal enrichment experience.

In the future, additional research, including a formal study with increased survey participants, will be essential to continue drawing on the topics covered in this paper. Universities should consider adapting their engineering curricula to allow for more accessibility for global engagement programs. Additionally, they should advise students on the return study abroad provides on the time and financial resources students "invest" in their global experiences. Lastly, with the ROI in mind, as more engineering students engage in global opportunities, they should be encouraged to inspire and motivate other engineering students to pursue similar experiences.

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