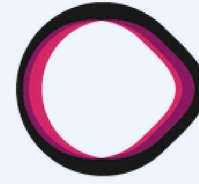




**WPI**



**OST**

Ostschweizer  
Fachhochschule

# **DEVELOPING BILATERAL EXCHANGE PROGRAMS IN ENGINEERING AND COMPUTER SCIENCE**

**13 October 2023**

**Jane Curtis, Jacqueline Herera,  
Isabella Lucas, & Danilo Ruberti**

**Sponsor: Ms. Magdalena Schreiber  
Advisors: Professor Uma Kumar and  
Professor Leonard Polizzotto**



**WPI**



**OST**

Ostschweizer  
Fachhochschule

# Developing Bilateral Exchange Programs in Engineering and Computer Science

An Interactive Qualifying Project Report  
submitted to the Faculty of  
WORCESTER POLYTECHNIC INSTITUTE  
in partial fulfillment of the requirements for the  
degree of Bachelor of Science

By:

Jane Curtis, Jacqueline Herrera, Isabella Lucas, Danilo Ruberti

Date: 13 October 2023

Worcester Polytechnic Institute

Report Submitted to:

Professor Leonard Polizzotto and Professor Uma Kumar

Sponsored by:

Ms. Magdalena Schreiber, OST

*This report represents the work of one or more WPI undergraduate students submitted to the faculty as evidence of completion of a degree requirement. WPI routinely publishes these reports on the web without editorial or peer review.*

## **Abstract**

Our research explores the U.S. STEM students' participation in international programs, spotlighting our sponsor, the Eastern Switzerland University of Applied Sciences (OST). Using surveys and interviews, we delved into students' attitudes and hurdles including cultural isolation, language proficiency, credit transfer issues, and financial constraints. Based on these insights, we proposed recommendations to increase bilateral exchanges between the U.S. and Switzerland, improve credit transfer systems, expand English-taught courses, and strengthen cultural integration mechanisms. Ultimately, by bolstering internationalization in education through our recommendations, we aim to pave the way for a more inclusive and innovative academic landscape, aligning with the societal needs of our time.

## Executive Summary

### Introduction:

The number of students studying internationally is steadily decreasing, potentially due to the global pandemic or decreasing interest. This decrease in student mobility is a significant concern as going abroad exposes students to diverse cultures and languages. This, in turn, helps connect more people and foster internationalization, increasing innovation globally (Jibeen & Khan, 2015). We collaborated with the Eastern Switzerland University of Applied Science (OST) to begin to understand the deterrents for U.S. STEM students and to develop an outline to target the ideal exchange program. In 2020, OST went through a multi-university merger creating 3 campuses. One strategic goal made during their merger was to enhance internationalization. This is the process of initiating greater interactions and collaboration between people from different countries (Knight, 2015). They hope to achieve this by increasing student mobility by 20% (M. Schreiber, personal communication, April 3, 2023; OST, n.d.-a). In order to accomplish this increase, they want to create more bilateral opportunities for OST and U.S. engineering and computer science students, connecting the United States and Switzerland.

### Background:

OST's dilemma and goal are not uncommon as currently, less than 15% of U.S. engineering and computer science students study internationally (Statista, 2022). This can be explained by the lack of established exchange programs for U.S. students to participate in across the world. In Europe, there is the European community Action Scheme for the Mobility of University Students plus (ERASMUS+): the largest university exchange program organization for over thirty years (Rami, 2021). However, participants must be associated with the European Union. Therefore since Switzerland and the United States are not, they may not use ERASMUS+'s resources or operational experience for future programs.

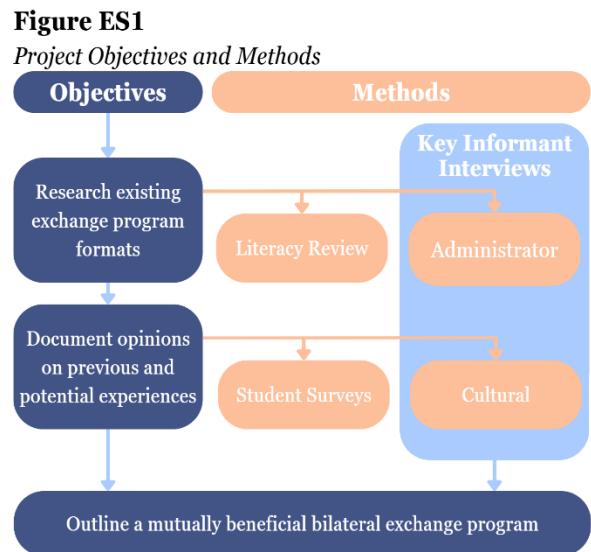
When creating educational collaborations between two countries many difficulties can arise, such as variability in semester durations, their alignment, and tuition costs. For example, WPI has 4 terms per year, each lasting 7 weeks, and OST has

2 semesters from September to January and late February to July. Based on these initial issues, our group decided to begin by researching current programs to highlight what was effective. Simultaneously, we conducted surveys to document the opinions of the U.S. STEM students participating in foreign exchange programs. Once substantial research and results were received, we interviewed academic and cultural experts to discuss how to outline a beneficial program at OST, taking into consideration academic, logistical, and cultural issues. Through these objectives, we were able to achieve our goal of outlining an ideal bilateral exchange between OST and U.S. students to increase the participation of those studying engineering and computer science.

### Methodology:

A mixed-method approach was used in our methodology, combining broad survey data with comprehensive interviews, which gave us the largest possible understanding of American STEM student sentiment regarding foreign exchanges. Our analysis employed a range of statistical techniques to identify trends, relationships, and patterns within the data. These included descriptive statistics, regression analysis, and hypothesis testing, among others to fully understand the nature of our data in a numerical sense.

Our first objective highlighted the need for and value of international exchange programs, especially within STEM domains, by recognizing the limited student participation in them, as seen with less than 15% of U.S. engineering students studying abroad in 2020-2021 (Statista, 2022). A comprehensive exploration of existing programs was undertaken, integrating insights from current programs and expert interviews. Our research focused on understanding exchange programs from establishment while also researching their challenges, such as financial and language barriers, that might hinder program participation. To analyze the data collected from key informant interviews, we employed a combination of coding and thematic analysis,



in line with the recommendations of Johnny Saldaña (2016) and Braun and Clarke (2006).

In an effort to dive deeper into the low participation rates of STEM students in exchange programs, our second objective adopted a mixed-method research design, entailing both surveys and interviews, to gather detailed data on student opinions. Using various social media platforms and promotional strategies, data was collected from over 300 students across 20 universities in 11 states across the U.S., providing a rich and varied data set. Employing a variety of statistical methods and sentiment analysis through the Natural Language Toolkit in Python, our research looked to understand and interpret the complex array of student perceptions and experiences with international exchange programs and where the general pain points exist in the process before, during, and after the exchange.

Through our research, we were then able to outline a mutually beneficial bilateral exchange program between OST and WPI. It stands out that the development of this proposal was enriched by integrating insights from diverse stakeholders, gathered through interviews with individuals such as academic administrators, international program coordinators, and entrepreneurs. This collaborative input, along with a qualitative data analysis method similar to our first objective, was instrumental in crafting a practical and well-rounded exchange program framework.

### **Results:**

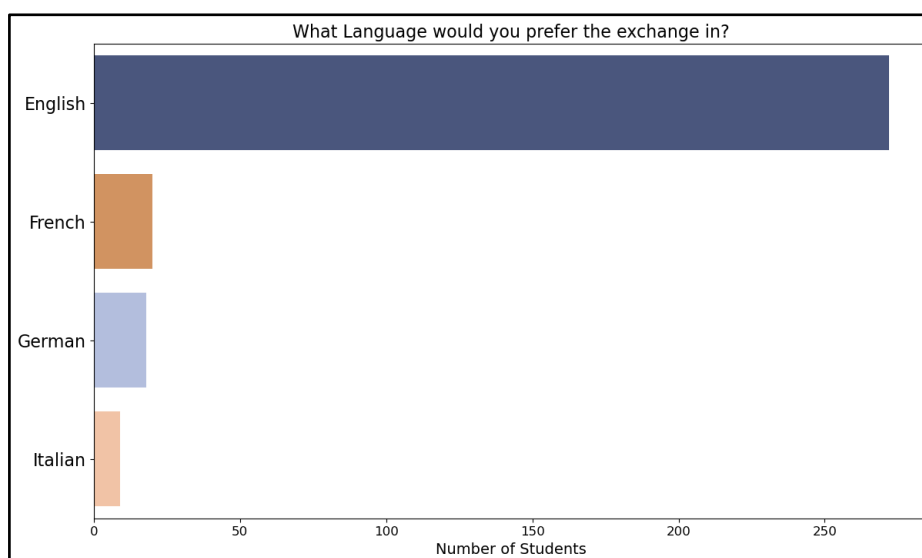
Through extensive research, involving interviews with WPI and OST administrators and surveys amongst U.S. STEM students, we garnered varied perspectives to construct an ideal engineering exchange program that would resonate with students' desires to study abroad. Insightful dialogues with Professor Nancy Burnham and Mr. David Court provided valuable first-hand experiences of Swiss culture. The comprehensive analysis of responses from our surveys also showed prevalent patterns and student inclinations toward international study at WPI and other institutions. This two-pronged approach not only enabled us to document opinions on past and potential experiences but also facilitated the accomplishment of our second objective, giving us a solid foundation in understanding the motivations and incentives that would encourage STEM students to participate in an exchange program.

We then had meetings with university administrators and subject matter experts, providing crucial feedback that narrowed down our proposal, ensuring its scope and viability in facilitating international educational experiences for STEM students.

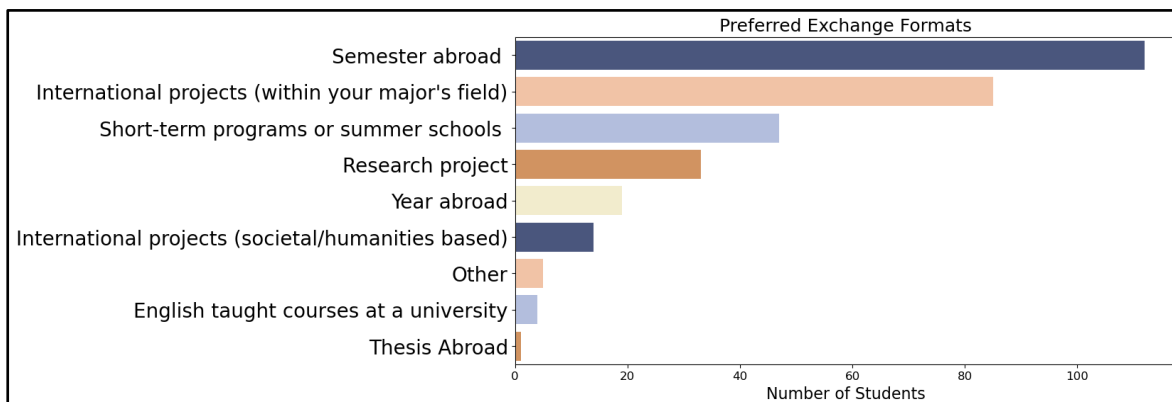
Our surveys reached students at 20 universities and over 300 students across the United States; this gave us confidence that the results we received were without bias as universities have different exposure to exchange programs. In other situations where their universities did not offer programs, students participated in a Council on International Educational Exchange (CIEE) study abroad program separate from their home university (CIEE, n.d.).

### Figure ES2

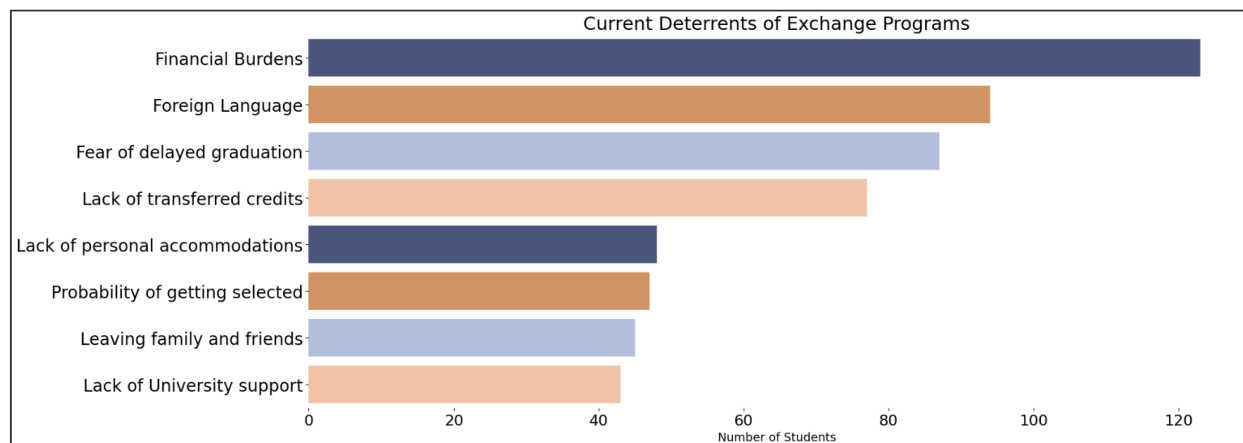
#### *Preferred Languages for Exchange Program Courses*



It is clear that in order to attract more U.S. students, courses need to be taught in English. 86.26% of students who were surveyed said they would prefer the exchange program to be in English.

**Figure ES3***Preferred Format for a Foreign Exchange Program*

In a potential foreign exchange opportunity, the majority of STEM students prefer a semester abroad style or an international project within their major's field.

**Figure ES4***Reasons Why Students Have Not Gone Abroad for School*

It is clear that financial burdens are a significant factor for students in deciding if they can or should participate in exchange programs. Evidently, this is the largest factor, especially for the students who have not participated.



**Interview Findings:**

Through an analysis of Swiss culture and existing bilateral exchange programs, our interviews with several key individuals provided foundational insights to bolster our inquiries. Engaging with Professor Nancy Burnham and Mr. David Court offered a deep dive into Swiss culture, from their quiet demeanor in public spaces to their methodical approach toward discussion and politics. Professor Burnham emphasized the significance of language in cultural assimilation and outlined an ideal program inclusive of a buddy system and cultural orientation. Meanwhile, Mr. Court's experiences underlined cultural shifts over decades and variances in Swiss and Canadian perspectives toward immigration and identity. Moreover, insights from the international office at OST and experiences with their buddy system and orientation program underscored the practical and social support mechanisms essential for the successful integration of exchange students.

Our exploration into the existing programs and challenges of OST in Switzerland, and WPI's current exchange endeavors, offered distinct but connected perspectives. Interactions with Ms. Magdalena Schreiber exposed the synchronicities and disparities between European and U.S. educational systems, revealing potential roadblocks like credit transfer issues, language barriers, and cultural and financial challenges for U.S. students. Conversely, WPI's small, yet diverse, exchange program illuminated the necessity of a strategic approach to develop mutually beneficial international partnerships. Our engagement with Kathleen Head, Krista Miller, and Dean John McNeill underscored the criticality of pre-departure credit transfer confirmations and the imperative of thorough curriculum alignment between partnering institutions.

**Recommendations:**

General recommendations were made to address the identified barriers from our STEM student survey and interview results.

In our surveys, we noticed a trend of students fearing missing graduation due to untransferable credits. During our interview with Kathleen Head and Krista Miller, this problem was reiterated when we learned more about the credit transfer system. In which no determination is made prior to departure and it is the student's responsibility

to choose the correct classes and hope they will be accepted by their department heads upon return (K. Head and K. Miller, personal communication, September 14, 2023).

**We recommend establishing which courses will transfer between universities.**

**We recommend creating a catalog for these classes to be displayed.**

**We recommend implementing a contract to ensure credit transfer will be endorsed prior to departure.**

Through our surveys, we were able to understand more of students' preferences seen in ES2, in which students prefer their exchange program to be taught in English. Studies show that in 2016 only 7.5% of U.S. university students study a foreign language during their college career (Stein-Smith, 2023). This can be attributed to English becoming the global language as it is the “leading language in business, technology, science, Internet, entertainment and even sports” (Nunan, 2001).

**We recommend increasing major-specific classes taught in English.**

**We recommend implementing pre-departure native language classes so pleasantries can be learned and help students live comfortably.**

In addition to the preference for English-taught courses, our administrative interviews with Ms. Magdelana Schreiber, Ms. Kathleen Head, and Ms. Krista Miller highlighted that host administrators need to provide support to students on nuanced aspects of a new culture and country (K. Head and K. Miller, personal communication, September 14, 2023; M. Schreiber, personal communication, August 31, 2023). This support would not be limited to providing information on applications for visas, highlighting relevant necessary documents, preparing for interviews, and navigating public transportation.

**Provide support in visa applications and cultural differences**

One of the most common deterrents for students participating in exchange programs, as mentioned in ES4, is the financial burden. Students typically have to pay

home tuition in addition to administrative, incidentals, housing, food, and extracurricular costs.

**We recommend implementing a true bilateral exchange in which only home tuition costs are paid at each university**

**We recommend settling an agreement between universities to have discounted housing for both sides of the exchange**

**We recommend introducing a scholarship to cover some costs for exchange students**

In Figure ES4, additional deterrents we highlight are the fear of leaving friends and family along with the potential of cultural assimilation difficulties. In discussions with Mr. Dave Court and Professor Nancy Burnham, they reiterated this and highlighted the importance of cultural understanding and a support network (D. Court, personal communication, September 7, 2023; N. Burnham, personal communication, September 5, 2023).

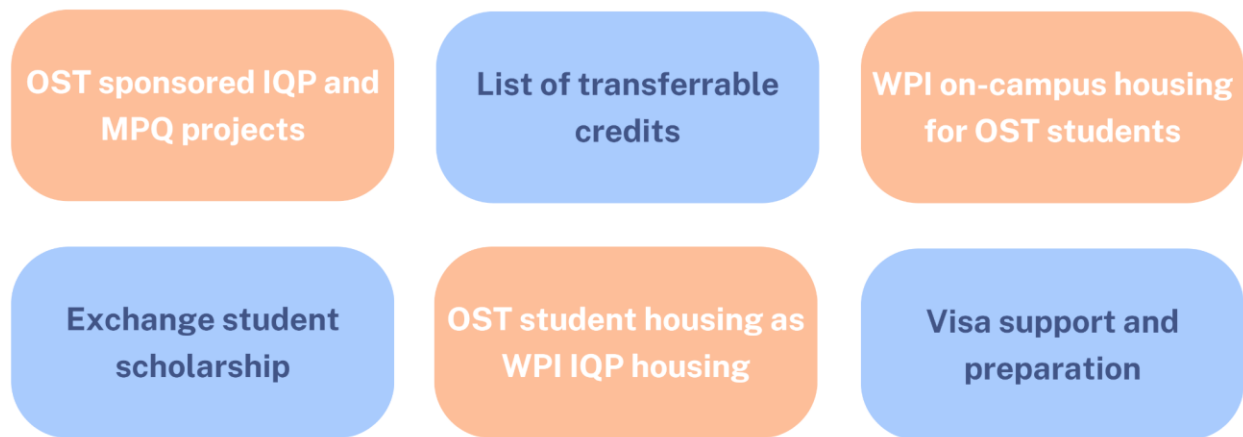
**We recommend requiring all incoming students to participate in a cultural orientation hosted by the international office.**

**We recommend adopting a buddy system in which students are paired and help foreign students acclimate to a new environment**

From these general recommendations, the ideal exchange between OST and WPI, specifically would have OST students attend WPI for the fall semester, during A and B terms, while WPI students would complete the Interactive Qualifying Project (IQP) in C term at the Zurich Project Center and stay through D term and into the summer for the exchange program at OST. The IQP is a WPI graduation requirement for students to complete an interdisciplinary project, typically during their junior year. WPI students participating would choose courses from an area where OST has enough English-taught courses, including Electrical Engineering, Renewable Energies and Environmental Engineering, Industrial Engineering, Systems Engineering, and Computer Science.

## Figure ES5

### *Items OST Should Inquire About from WPI*



To begin the implementation of this program, we recommend the necessary OST and WPI faculty communication for the implementation of this bilateral exchange program as highlighted in figure ES5. In addition, communication will be initiated by Professor Nancy Burnham and Kathleen Head who will then connect OST with the necessary WPI offices and administrators.

### **Conclusion:**

Our recommendations and insights have a broader application than just OST and WPI, specifically to incentivize institutional and cultural shifts to enrich global experiences and deepen educational partnerships. Despite employing various strategies to address our research's limitations such as potential group-response bias and time constraints our recommendations had to shift to primarily center around WPI and OST due to the higher response rates from WPI students and the restricted scope of our data collection. Our collected data however, reflecting student sentiments towards studying internationally, is a valuable tool for universities nationwide to shape and refine international study programs. Furthermore, our research aligns with the United Nations' Sustainable Development Goal 4, which includes inclusive and equitable quality education, and harmonizes with OST's aspirations to enhance internationalization between the U.S. and Switzerland, offering a potential pathway towards enriched, global educational experiences.

## Table of Contents

Abstract	I
Executive Summary	II
Table of Contents	XI
List of Figures	XIV
List of Tables	XVII
List of Terms	XVIII
Authorship	XX
Meet the Team	XXI
Acknowledgements	XXII
Chapter 1: Introduction	1
Chapter 2: Background	4
2.1: Context for Increasing Internationalization through Exchange Programs	4
2.2: Eastern Switzerland University of Applied Sciences (OST)	5
2.3: Project Stakeholders	6
2.4: Exchange Programs	10
2.4.1: <i>Benefits of International Exchanges</i>	12
2.5: Student Involvement in Exchange Programs	13
2.5.1: <i>Common Student Motivators</i>	13
2.5.2: <i>Common Student Barriers</i>	15
2.5.3: <i>Common Groups Who Historically Participate Less</i>	16
2.6: Historical Motivations for Promoting Internationalization in the U.S.	17
2.7: U.S. Institutions' Strategies for Exchange Programs	18
2.7.1: <i>Financial Support and Scholarships</i>	18
2.7.2: <i>Promoting Exchange Programs and Expanding Partnerships</i>	18
2.7.3: <i>Pre-Departure Preparation and Language Support</i>	19
2.8: Case Study	19
2.8.1: <i>Engineering Exchange Programs in Brazil</i>	19
2.9: Summary	20
Chapter 3: Methodology	21
3.1: Research Existing International Exchange Programs	21

3.2: Document Opinions of STEM Students on Exchange Programs	23
3.3: Proposal of a Mutually Beneficial Exchange Program	25
Chapter 4: Results and Analysis	27
4.1: Survey Findings	27
4.1.1: <i>STEM Students on Studying Abroad</i>	28
4.1.2: <i>Student Motivators or Deterrents</i>	33
4.1.3: <i>Program Logistic</i>	38
4.2: WPI Global Survey Findings	42
4.2.1: <i>Culture and Perspective</i>	42
4.2.2: <i>Post-Graduation Preparation</i>	45
4.3: Interview Findings	46
4.3.1: <i>Swiss Culture</i>	47
4.3.2: <i>Programs in OST and Europe</i>	49
4.3.3: <i>Credit Transfers</i>	51
Chapter 5: Recommendations	53
5.1 General Recommendations	53
5.1.1 <i>WPI Specific Recommendation to Institute a Bilateral Exchange</i>	54
5.2: Addressing Academic and Logistical Challenges	55
5.2.1: <i>Credit Transfer and Course Catalogs</i>	56
5.2.2: <i>Expanding English-Taught Courses</i>	56
5.2.3: <i>Administrative and Daily Life Assistance</i>	57
5.3: Financials	57
5.3.1: <i>Tuition and Housing</i>	57
5.3.2: <i>Outside Fees</i>	58
5.4: Enhancing Cultural Integration	58
5.4.1: <i>Language Preparation and Support</i>	58
5.4.2: <i>Buddy System</i>	59
5.4.3: <i>Cultural Orientation Programs</i>	61
5.5: Implementation Strategy	61
Chapter 6: Conclusion	64
6.1: Limitations and alternatives	64

6.2: Short-term and long-term implications	64
6.3: Sustainable Development Goals	66
References	67
Appendix	75
Appendix A: Survey for U.S. STEM Students about Foreign Exchange Programs (Interest/Non-Interest and Experiences)	75
Appendix B: Survey for WPI Students Who Have Participated in the IQP, HUA, or MQP Abroad	77
Appendix C: Key Informant Interview for OST Administrators	79
Appendix D: Key Informant Interview Questions to Administer Focusing on Cultural Adjustment	80
Appendix E: Key Informant Interview Questions to Administer Focusing on Cultural Adjustment	81
Appendix F: Key Informant Interview Questions to Administer to Experts in Bilateral Exchanges	82
Appendix G: Key Informant Interview Questions to Administer to Experts in Bilateral Exchanges	83
Appendix H: Key Informant Interview Questions to Administer to Experts in Bilateral Exchanges	84
Appendix I: Consent Form for Surveys Sent Out to U.S. Students	86
Appendix J: Consent Form Sent Out to Those Interviewed	87

## List of Figures

<b>Figure ES1</b> Project Objective and Methods	iii
<b>Figure ES2</b> Preferred Languages for Exchange Program Courses	v
<b>Figure ES3</b> Preferred Format for a Foreign Exchange Program	vi
<b>Figure ES4</b> Reasons Why Students Have Not Gone Abroad for School	vi
<b>Figure ES5</b> Items OST Should Inquire About from WPI	x
<b>Figure 1</b> Map of Switzerland Showing OST Campuses and Surrounding Countries	5
<b>Figure 2</b> Students Participating in Abroad Opportunities	8
<b>Figure 3</b> Host Regions of U.S. Study Abroad Students 2016/17 - 2020/21	16
<b>Figure 4</b> Project Objectives and Methods	21
<b>Figure 5</b> Locations Where the Survey for U.S. STEM Students About Foreign Exchange Programs (Interest/Non-Interest and Experiences) Was Taken	28
<b>Figure 6</b> U.S. STEM Students Who Have Gone Abroad for School vs. Those Who Have Not	29
<b>Figure 7</b> Those Who Would Consider Traveling to Switzerland for School (All Schools)	31
<b>Figure 8</b> Hesitations Students Had Prior to Traveling Abroad for School (WPI)	33
<b>Figure 9</b> Hesitations Students Had Prior to Traveling Abroad for School (Other Universities)	33
<b>Figure 10</b> Hesitations Students Had Prior to Traveling Abroad for School (All Universities)	34



<b>Figure 11</b> Reasons Students Have Not Gone Abroad for School (WPI)	35
<b>Figure 12</b> Reasons Students Have Not Gone Abroad for School (Other Universities)	35
<b>Figure 13</b> Factors That Contributed to Students Traveling Abroad for School (WPI)	36
<b>Figure 14</b> Factors That Contributed to Students Traveling Abroad for School (Other Universities)	36
<b>Figure 15</b> Factors That Would Convince Students to Travel Abroad for School (Who So Far Have Not) (WPI)	37
<b>Figure 16</b> Factors That Would Convince Students to Travel Abroad for School (Who So Far Have Not) (Other Universities)	37
<b>Figure 17</b> Preferred Languages for Exchange Program Courses	38
<b>Figure 18</b> The Field of Study Compared to Who Has or Has Not Participated in a Study Abroad or a Foreign Exchange	39
<b>Figure 19</b> Preferred Format for a Foreign Exchange Program	40
<b>Figure 20</b> Preferred Format for a Foreign Exchange Program (WPI)	40
<b>Figure 21</b> Preferred Format for a Foreign Exchange Program (Other Universities)	41
<b>Figure 22</b> Opinions on Cultural Awareness Improvements, Assimilation into Culture, and Usefulness of Project (Abroad Specifically)	42
<b>Figure 23</b> Student Experience on Collaborating with Other Students or Sponsors/Administrators	43
<b>Figure 24</b> Student Experience in Interacting with Their Project Center or Sponsors	43

<b>Figure 25</b> How Often Students Spoke the Native Language (if applicable)	44
<b>Figure 26</b> Opinions on Collaboration Skills Improvement and Usefulness of Project (Abroad Specifically)	46
<b>Figure 27</b> Informant Interviews: Professor Nancy Burnham	47
<b>Figure 28</b> Informant Interviews: Mr. David Court	48
<b>Figure 29</b> Informant Interviews: Ms. Magdalena Schreiber	49
<b>Figure 30</b> Informant Interviews: Ms. Kathleen Head & Ms. Krista Miller	50
<b>Figure 31</b> Informant Interviews: Dean John McNeill	52
<b>Figure 32</b> OST International Student Program	61

**List of Tables**

<b>Table 1</b> Students Who Have or Have Not Studied Abroad or Participated in an Exchange Program, Organized by University and Year of Study	30
<b>Table 2</b> Students Who Would Participate in an Exchange Program in Switzerland	32

### List of Terms

<b>Term</b>	<b>Definition</b>
IQP	Interactive Qualifying Project; This is a project completed in interdisciplinary groups to solve an issue typically surrounding science and society. This will typically be completed during the junior year at WPI
PQP	Pre Qualifying Project; supplementary meetings within the pre-departure classes (ID 2050) that typically include meetings with the IQP advisors and can include language and culture classes
MQP	Major Qualifying Project; typically completed during the senior year at WPI; similar to a senior capstone project within a student's major
HUA	Humanities and Arts Project; capstone project for the humanities depth students must complete during their time at WPI
GEO	Global Experiences Office; help students get off campus for the IQP in addition to helping look into the possibilities of the MQP, HUA, and other exchange programs with universities that have a partnership with WPI

All term dates are approximations to give more context to our recommendations and the differences in structure.

<b>Term</b>	<b>Definition</b>
WPI Term System	The WPI curriculum revolves around a term system with 4 general terms during the traditional school year and 2 additional summer terms; the typical semester will have 2 terms with each term being typically 7 weeks.
A term	This is in reference to the WPI term system for classes, typically from August to the middle of October; all terms last 7 weeks
B term	This is in reference to the WPI term system for classes, typically from late October to the middle of December (typically around the 15th); all terms last 7 weeks
C term	This is in reference to the WPI term system for classes, typically from early January (around the 10th) to the beginning of March; all terms last 7 weeks
D term	This is in reference to the WPI term system for classes, typically from the early middle of March (around the 11th) to the beginning of May; all terms last 7 weeks

WPI Fall Semester	At WPI, this consists of A and B term
WPI Spring Semester	At WPI, this consists of C and D term
OST terms	The OST curriculum revolves around 2 semesters: the autumn and spring semester; they typically have 4 months of lectures, with an additional one month of exams
OST Fall Semester	Typically begins in the middle of September and lasts until late December (around the 23rd); there is a break until examinations begin around the middle of January until early February (around the 10th)
OST Spring Semester	Typically begins in the middle end of February (around the 20th) and lasts until early June (around the 10th); examinations begin in the middle of June and last until the middle of July

## Authorship

All team members collaborated in the editing content, grammar, and structure of every section.

<b><u>Chapter/Section</u></b>	<b><i>Jane Curtis</i></b>	<b><i>Jacqueline Herera</i></b>	<b><i>Isabella Lucas</i></b>	<b><i>Danilo Ruberti</i></b>
Abstract	Content, grammar and structure editor	Content, grammar and structure editor	Content, grammar and structure editor	Lead Author
Executive Summary	Content, grammar and structure editor	Co-Author	Co-Author	Co-Author
Acknowledgements	Content, grammar and structure editor	Content, grammar and structure editor	Lead Author	Content, grammar and structure editor
Chapter 1: Introduction	Co-Author	Co-Author	Co-Author	Co-Author
Chapter 2: Background	Co-Author 2.3, 2.6	Co-Author 2.1, 2.3, 2.4, 2.5	Co-Author 2.2, 2.5, 2.9	Co-Author 2.4, 2.7, 2.8
Chapter 3: Methodology	Co-Author 3.1,3.3	Co-Author 3.1, 3.3	Co-Author 3.1, 3.2	Co-Author 3.2, 3.3
Chapter 4: Results	Co-Author 4.3	Co-Author 4.1, 4.2, 4.3	Co-Author 4.1, 4.2, 4.3	Author Graphs
Chapter 5 Recommendations	Co-Author 5.1, 5.2, 5.3	Co-Author 5.1, 5.2, 5.3	Co-Author 5.1, 5.3, 5.5	Lead Author 5.4
Chapter 6: Conclusion	Lead Author	Content, grammar and structure editor	Content, grammar and structure editor	Content, grammar and structure editor

This work is original to the project authors and study participants and was not generated or assisted using ChatGPT or any other AI tools.

## Meet the Team

Hi! My name is Jane Curtis, and I'm from Saint Louis, Missouri. I am currently a 3rd year Civil Engineering major at WPI. I have absolutely loved having the experience of living in Switzerland the last 7 weeks, getting to experience Swiss culture, and traveling to so many beautiful locations within Switzerland with friends I've gotten to make during IQP. It has been such a great opportunity to work with our sponsor at OST and learn even more about opportunities to study globally.



Hello! My name is Jacqueline Herera and I am a junior Civil Engineering major from Alpine, New Jersey. I completely fell in love with Switzerland for the past seven weeks and have enjoyed every minute of being here. This project has given me the opportunity to see more of Europe, interact with locals, and expand my global perspective, all of which contributed to my growth on a professional and personal level.

Hello! My name is Isabella Lucas, I am originally from Sunnyvale, California but have fallen in love with the fall in Massachusetts. I am currently a junior at WPI studying Robotics Engineering. I was initially planning on continuing my masters studies at WPI but this experience has opened my eyes to all of the opportunities to study globally. This IQP in Switzerland was amazing and allowed me to travel to new places, experience a new culture, and interact with new people, all of which I can't wait to do again.



Hi! My name is Danilo Ruberti, I am from São Paulo, Brazil and moved to Los Angeles, California when I was 12 years old. I am currently a Junior at WPI studying Data Science and Business. The past 7 weeks have been a great journey and I've enjoyed learning more about Swiss culture and the beautiful sights all around the country. I've also really enjoyed being immersed in student life at OST and working with its international office.

## Acknowledgements

The successful completion of this Interactive Qualifying Project was only possible with the support of many individuals. We would like to specifically give our thanks to the following:

- Our sponsor from the Eastern Switzerland University of Applied Sciences, Ms. Magdalena Schreiber, for highlighting helpful organizations to research, being a willing interviewee to give us multiple perspectives on exchange programs, connecting us with Ms. Kathleen Head and Ms. Krista Miller, offering us helpful feedback on all stages of our project, and inviting us to OST's international student days, providing us an additional perspective of OST.
- Our advisors, Leonard Polizzotto and Uma Kumar, for supporting our team throughout our 14 weeks of researching, interviewing, writing, revising, and completing our project. Their unique perspectives allowed us to view the issue from multiple angles and create the most encompassing development of a bilateral exchange program. We want to thank Professor Polizzotto for connecting our group with KEEN, and Northeastern University in order to spread our U.S. STEM Student survey across the country. In addition to highlighting WPI experts to interview such as Dean John McNeill. We would also like to thank Professor Kumar for her expertise in our report, helping us make edits and encouraging the use of graphics to maintain the attention of our audience.
- Our ID 2050 professor, Curt Davis, for offering us extremely helpful edits and suggestions on the beginning stages of our proposal that allowed us to begin working efficiently in Zurich, in addition to teaching us how to verify and cite quality sources. We would also like to thank him for allowing us to interview him and putting us in contact with another WPI faculty member to interview, Professor Aaron Sakulich, in addition to facilitating conversations with the University of Delaware Center for Global Programs and Services (CGPS).
- Worcester Polytechnic Institute (WPI) faculty members Ms. Kathleen Head, and Ms. Krista Miller from the Global Experiences Office, Dean of Engineering John McNeill, and Zurich Project Center Director Professor Nancey Burnham for



allowing us to interview them on their experiences and experiences surrounding exchange programs and Swiss culture.

- Dave Court for allowing us to interview him on his experience moving from Canada to Switzerland and providing us with more information on Swiss Culture.
- The U.S. STEM students who participated in our surveys on their preferences and experiences on studying in a foreign country. These responses allowed us to tailor our responses specifically to the needs of U.S. students and built the foundation our project was based on.

## Chapter 1: Introduction

The goal of increased internationalization in higher education has been discussed and implemented throughout the world for at least three decades (Teichler, 2017). Internationalization in education refers to the practice of incorporating diverse perspectives of culture and language into higher education (Teichler, 2017). It involves preparing students to be more globally aware by promoting diversity, multilingualism, and a broader understanding of different cultural perspectives (Teichler, 2017). Internationalization links people from all over the world by creating more opportunities and global competitiveness, allowing for better interactions between both peers and their global counterparts (NCA, 2016). International exchange programs play a critical role in increasing internationalization in education by providing opportunities for students to experience diverse cultures and languages in order to develop the skills required for a broader mindset (Atalar, 2019).

Currently, there are few programs within the U.S. that aid university students with finding and participating in exchange programs, apart from those directly from the university they are enrolled in, especially for STEM students. This is most likely because of the difference in academic schedules, with European university fall semesters starting in late September with exams being completed in January, and the spring semesters starting in February and stretching to June and July when exams take place, so it is much more difficult to fit a semester abroad at any school within a typical American class schedule. Due to this, it is harder for universities abroad to connect with U.S. students who are interested in foreign exchange. One specific university that has encountered this issue would be the Eastern Switzerland University of Applied Sciences (OST or Ostschweizer Fachhochschule), the sponsor of this Interactive Qualifying Project (IQP). With the intent of improving bilateral internationalization, one of their eight strategic goals set to increase student mobility across all students to 20% (M. Schreiber, personal communication, April 3, 2023; OST, n.d.-a). They found a significant discrepancy in the involvement of OST STEM students in exchange programs, compared to other majors, and aim to remediate this by bilaterally increasing the number of university students arriving from the U.S. (M. Schreiber, personal communication, April 3, 2023).

For European countries, the most common solution would be the European community Action Scheme for the Mobility of University Students plus (ERASMUS+): the largest university exchange program organization for over thirty years (Rami, 2021). However, since participants and hosts in the ERASMUS+ program must be from the European Union, the United States and Switzerland cannot use their resources or operational experience. To remedy this, OST worked with a previous IQP group from Worcester Polytechnic Institute (WPI) last year, and they focused on achieving this goal by increasing the outbound mobility of OST engineering and computer science students. The main recommendations that the group made to OST were to increase the number of partnerships with other universities, improve the academic alignment of study abroad programs, integrate more language courses, and make programs more affordable (Frisch et al., 2022). Based on these recommendations, our project was created to continue their work.

The goal of our project was to outline the ideal bilateral exchange between OST and U.S. students to increase the participation of those studying engineering and computer science. We achieved this goal through the following three objectives:

- 1) identify and research existing exchange program frameworks to specifically highlight what is working within these programs along with potential new opportunities;
- 2) document the opinions of engineering and computer science community members on potential and previous experiences studying in foreign countries; and
- 3) outline implementation of a mutually beneficial exchange program that promotes bilateral interactions within the STEM field and strengthens internationalization, specifically between OST and WPI.

In completing this IQP, there will be increased bilateral exchange between OST and universities in the U.S., and the research completed will aid other universities in expanding their foreign exchange opportunities. This report consists of four remaining sections. The first section provides a contextual background on exchange programs to give an understanding of the project's scope. The second section outlines the

methodology our team employed to achieve the project's objectives. The third section provides the results of surveys and interviews. The fourth section explains general recommendations for universities and specific implementation options between WPI and OST to create an exchange program and incentivize more students. The final section discusses the implications of our work, who will benefit, possible uses of our findings and recommendations, and the alignment of our project with the Sustainable Development Goals (SDGs).

## Chapter 2: Background

The following chapter introduces the background of internationalization and exchange programs in United States universities, the sponsors of the project, and who this impacts. In addition, it covers research into exchange programs and how they operate in the United States with common motivators and barriers and groups of students historically missing from these programs. We conclude with a case study of an international exchange program for American engineering students in Brazil.

### 2.1: Context for Increasing Internationalization through Exchange Programs

The term *internationalization* may not be familiar to the layperson; however, it has been of increasing political and societal importance for over fifty years. During the Cold War, the United States became concerned about its image of other countries, so it began to make efforts to improve its reputation through internationalization in higher education (Bartell, 2003). The American Council on Education's Commission on International Education emphasized that students must understand aspects "of other nations, languages, and cultures in order to develop the appropriate level of competence to function effectively in the rapidly emerging global environment" (Bartell, 2003, p. 49). To increase internationalization, creating new and engaging exchange programs is an effective way to gauge interest and participation from U.S. students.

According to the Institute of International Education, between the 2013/2014 and 2018/2019 academic years, U.S. students going abroad increased steadily at an average rate of 3.08%. However, in recent years, there has been a significant decrease in student participation (Statista, 2022). Due to COVID-19, data on participation is hard to analyze and tell whether or not the programs had an effect on students' decision to go abroad or if other factors were involved. The fluctuation of student participation in exchange programs affects global skill production and reshapes the allocation of university-educated workers in the U.S. and international labor markets (Bound et al., 2021), so succeeding in increasing programs and participation is important.

## 2.2: Eastern Switzerland University of Applied Sciences (OST)

The Eastern Switzerland University of Applied Sciences (OST) is a leading university that recently went through a merger with three former universities in 2020. The merger created a larger university with campuses in St. Gallen, Rapperswil, and Buchs, as seen in Figure 1. With the addition of two more locations, programs at OST have increased and become more diverse, giving prospective incoming students greater opportunities to study abroad or participate in an exchange program during their time at the university. These include undergraduate and graduate programs in business, engineering, information technology, life sciences, social work, and health (M. Schreiber, personal communication, April 3, 2023). Our primary sponsor at OST is Ms. Magdalena Schreiber who works in the Head International Office for the School of Engineering, Computer Science, Architecture, Civil Engineering, Landscape Architecture, and Spatial Planning.

**Figure 1**

*Map of Switzerland Showing OST Campuses and Surrounding Countries*



*Note.* Image used with permission by (M. Schreiber, personal communication, April 3, 2023).

Upon the completion of this merger, OST committed to increasing its international status. Their goal is to increase their student mobility across all majors to 20% by 2026; however, the degree of internationalization varies on majors: business is at 20% while engineering is only at 10% (M. Schreiber, personal communication, April 3, 2023). They are working on promoting participation bilaterally, increasing opportunities for U.S. students and OST students in Switzerland. This is their second year involved with WPI's IQP program. Last year, they focused on increasing OST students engaging in exchange programs, while this year OST is focusing on involving more U.S. engineering and computer science students in their exchange programs.

At OST, classes are mostly taught with a practical focus rather than a theoretical one. In order to ensure incoming students are prepared for these courses, they are required to have at least one year of prior experience, typically in the form of an internship. At the university, most undergraduate classes are taught in German and all graduate classes are taught in English, which is important to note while creating recommendations for this project.

With the intention of expanding its engineering programs, OST is in the process of joining the European Project Semester (EPS), an engineering projects program for students who have completed two years of study (EPS, n.d.). Here, they are able to work in international and interdisciplinary teams in cooperation with local businesses or research centers (EPS, n.d.).

### **2.3: Project Stakeholders**

There are many stakeholders whose interests align with the success of our IQP, the first of which is the OST Administration and Faculty. Since the merger between the three schools to form OST, they have been focused specifically on student mobilization internationally (M. Schreiber, personal communication, April 3, 2023). OST focuses on increasing participation from English-speaking countries, specifically American schools since there is not currently an established exchange program from Europe to the United States. In addition, due to the difference in overall school schedules, student program duration preferences, and difficulty transferring international engineering credits, an objective literature review into barriers is necessary. Mirroring the IQP from last year, Ms. Schreiber wants information and opinions from U.S. students rather than OST

students (the objective of the previous IQP), on what they want in a foreign exchange program. Information on motivators will help establish both the framework and partnerships to work with American universities and be able to get more of their students to travel abroad and in the U.S.

A second stakeholder is OST themselves. Bilateral exchanges allow students to pay only home institution tuition along with smaller “ancillary fees” to the host institution (Queen’s University, n.d.). The agreement allows both institutions to be equal participants in sending and receiving students; however, when they are not, the university with fewer incoming students has fewer benefits. If the transfer of students between universities does not have an equal ratio of incoming and outgoing, the university with more incoming students will be impaired. They will face financial issues as the ancillary fees will not cover the additional expenses for that imbalance. Additionally, universities may struggle with accommodating students if they do not have the capacity to guarantee housing, laboratory resources, and more (J. McNeill, personal communication, September 14, 2023). An increase in students from other countries also creates and celebrates global diversity and learning processes (Knight, 2004) which helps further the engineering growth process by inserting new points of view, thought processes, and understandings. To ensure an equal exchange and grow the collaboration skills of U.S. and Swiss students alike, there should be an increase of American students at OST and other Switzerland universities.

Another group greatly impacted by our IQP is U.S. engineering students. There are many constraints on U.S. students that discourage foreign exchange programs. These include a lack of proper financing (Needy et al., 2012) and a strong worry about how to get the proper courses to graduate on time and follow the guidelines given by the Accreditation Board for Engineering and Technology (ABET) (Needy et al., 2012). In the United States, STEM programs must follow ABET’s guidelines to get verification that they meet the global standard, but looking into the Washington Accord will allow for international accreditation of engineering degrees (International Engineering Alliance, n.d.). However, to ease hardships presented within the OST exchange programs, more insight is required to understand how to make them more accessible for students, which is what our IQP was able to provide, therefore providing more accessibility to be able to get more U.S. student participation.



**Figure 2***Students Participating in Abroad Opportunities*

*Note.* This image depicts students enjoying their break outside at the campus of OST Rapperswil during an international exchange program, showing the benefits of cultural immersion. Image used with permission by (M. Schreiber, personal communication, April 3, 2023).

Similarly, close to 4,000 of the students from OST (M. Schreiber, personal communication, April 3, 2023) had a large amount of stake in our IQP. They are already able to participate in abroad opportunities (Heldstab et al., n.d.) since OST has made several implementations, including international days, a more accessible and user-friendly website, and advertising the opportunities with past student experiences (M. Schreiber, personal communication, April 3, 2023). Making connections and partnerships with American universities will give OST students more opportunities, and increase the likelihood of finding a program that fits well with their personal needs and degree requirements, which therefore increases the likelihood of more students participating abroad.

An often overlooked group of stakeholders within our IQP are parents of the students going abroad (L. Polizzotto, personal communication, September 4, 2023). Parents are typically “footing the bill” (L. Polizzotto, personal communication,

September 4, 2023) and since an exchange program is often quite expensive, it is treated like an investment. The “return on investment” can include giving their child a wider world view by getting to experience a new culture, learning and becoming fluent in a new language, boosting their child’s resume, gaining more independence through problem-solving, and creating more job opportunities for their child post-graduation (Study Metro, 2023). When put together, these are often the reasons that parents decide that the experience and sum of money is worth it.

Professors from both participating institutions are essential stakeholders in international educational exchange programs. Faculty from the home institution often serve as advisors for students going abroad, a role that demands adaptability to new educational and cultural contexts (Leask, 2009). This experience may enrich their teaching skills but also places additional responsibilities on them, such as adapting to different grading systems and academic cultures (Knight, 2004). Meanwhile, professors at the host institution, like OST, face the challenge of incorporating international students into their classrooms. These educators may need to modify their teaching methods to account for linguistic and cultural diversity, which can both enrich and complicate classroom dynamics (Deardorff, 2006). This situation underlines the need for faculty development programs that provide professors with the skills required to manage diverse classrooms effectively (Leask & Carroll, 2011). In essence, professors are not merely disseminators of academic content but are also facilitators of a more global educational experience (Deardorff, 2006). In the case of the IQP from WPI, professors travel as advisors to the students, and they also have to move temporarily to a new country and learn the culture and customs, much like the students do. There are also instances, also at WPI, where there are exchanges set up, students arrive from other countries and professors have to adapt to foreign languages their students speak and be able to help them to the best of their abilities, while still being in the U.S. (A. Sukulich, personal communication, September 5, 2023). On either side of the situation, there is understanding and adaptation that is required should an exchange program be expanded and/or implemented.

## 2.4: Exchange Programs

Exchange programs are educational opportunities that allow students to temporarily attend a foreign institution while continuing their enrollment at their home university or institution (Global Education Oregon, n.d.). Exchange programs are different from study abroad programs where students typically enroll directly in a foreign university or institution for a specified period without a formal partnership with their current university. In addition to study abroad programs without a formal partnership, some universities maintain auxiliary campuses in foreign countries and send students to their campuses abroad. One example of this is Syracuse University in which students can take classes from one of their 6 auxiliary Syracuse campuses in a foreign country (Syracuse University, n.d.). Exchange programs facilitate the sharing of knowledge, experiences, and cultures between students from different countries, which fosters a more interconnected and globalized world.

The history of exchange programs can be traced back to the 1920s when the first study abroad program in the United States of America was established at the University of Delaware. A group of eight students was led by the daring Professor Raymond Watson Kirkbride on a journey to various parts of France (University of Delaware, n.d.). On July 7, 1923, they sailed the Atlantic on the Rochambeau and stayed in Nancy for six weeks in a French Immersion program before moving on to Paris (University of Delaware, n.d.). In consequence, many more study abroad programs appeared in the 1920s, many only offering summer study abroad programs to Europe (Lee, 2012). Over the past century, exchange programs have expanded and evolved and have become a significant component of international education & student development (Lee, 2012).

An important example of a U.S. program is the Interactive Qualifying Project, or IQP, that takes place at Worcester Polytechnic University (WPI). The IQP is a project completed by an interdisciplinary team to accomplish a scientific and societal problem. This is completed during an entire term of 7 weeks at WPI, either during the traditional school year or over the summer, and is a graduation requirement for all students (Worcester Polytechnic Institute, n.d.-c). While students do not have to go abroad to complete their IQP, 94.5% end up leaving Worcester, MA and 79.1% end up leaving the U.S. in the 2022-2023 academic year, creating a global aspect to their projects (K. Head, personal communication, October 4, 2023). Since the IQP is built into the curriculum at

WPI, students do not worry about delayed graduation (Worcester Polytechnic Institute, n.d.-c). Additionally, each student is given the Global Scholarship of up to \$5,000 to cover all billable costs, such as program fees and housing, for their project (Worcester Polytechnic Institute, n.d.-b). In addition, this scholarship diminishes the non-billable costs that students pay in order to participate, including round-trip transportation, meals, and any incidentals. This further incentivized students at WPI to participate, as proven by the increase in students completing their IQP off-campus from 70% in the 2016-2017 academic year to 94.5% in the 2022-2023 academic year after the creation of the scholarship in 2017 (K. Head, personal communications, October 9, 2023).

The ERASMUS+ Programme is a European Union initiative that promotes and facilitates international student exchange, academic cooperation, and cultural experiences among higher education institutions across Europe (Erasmus+, n.d.). Currently, programs similar to the Erasmus Programme have become a large part of higher education in Europe and have been instilled for many years to develop the minds and technical skills of European students (Erasmus+, n.d.). Erasmus has a budget of €26.2 billion and more than 300,000 current students; clearly showing the level of importance given to student exchange programs in Europe (European Commission, 2021). The ERASMUS+ program works in most European universities because they have similar semester timelines, where the fall term starts in mid-September and ends before Christmas with exams in January and the spring semester starts in late February and ends in June with exams in July. In addition, they have the same university credit system, the European Credit Transfer and Accumulation System (ECTS), making it easy for credits to be transferred. Across Europe tuition costs are similar, allowing exchange program fees through ERASMUS+ or other organizations to remain balanced, especially in comparison to the U.S.

The International Engineering Program (IEP), offered by the University of Rhode Island (URI), is a successful abroad program for students interested in completing a Bachelor of Science (B.S.) in engineering and a Bachelor of Arts (B.A.) in a foreign language (University of Rhode Island, n.d.) within five years. IEP students complete a full abroad, studying at a partnered institution and an international internship for a semester each (University of Rhode Island, n.d.). With 11 exchange locations in 5 different countries, students develop “strong language skills, strong cross-cultural

communication skills, appreciation for different points of view and different attitudes” (Grandin, J. M., & Berka, S., 2014). In the past 27 years of partnership with the German university, Technische Universität Braunschweig (TUBS), 509 URI students have gone abroad to TUBS and 395 TUBS students went abroad to URI (University of Rhode Island, 2023.). In this program, URI students leave for Germany in late August to participate in a one-month immersion program to prepare for the winter semester at TUBS where they will learn about cultural differences, safety, academics, and internships (University of Rhode Island, n.d.). After completion of this program, students are given two weeks to travel to other parts of Germany, with their semester starting mid-October (University of Rhode Island, n.d.). In return, TUBS students are able to go abroad to URI and obtain a U.S. degree as a Master of Science (M.Sc.) or Master of Business Administration (MBA) in addition to the German Master’s degree within three semesters (Braunschweig, n.d.). As a program that has thrived on bilateral exchange since 1995, the URI and TUBS administration have made it so that TUBS students assume the costs for language courses in Braunschweig from the incoming URI students, thus waiving tuition fees (Braunschweig, n.d.).

#### ***2.4.1: Benefits of International Exchanges***

There are many benefits associated with international exchanges, including academic, personal, and professional growth, as well as improved international relations. Some of the key advantages include:

- allowing students to gain an edge in the job market upon graduating by giving them the “opportunity for students to gain work-related skills in a global context” (Farrugia & Sanger, 2017, p. 20);
- improved language skills and intercultural understanding and acknowledgment (Engle & Engle, 2004); and
- increased adaptability, problem-solving skills, and self-confidence whilst enhancing “cultural awareness and personal development” of each student (Black & Duhon, 2006, p. 140).

The U.S. State Department also recognizes the importance of international exchanges for diplomacy and the promotion of understanding between nations. Programs such as the Fulbright Program and the International Visitor Leadership Program (IVLP), have been implemented to foster global collaboration and communication (U.S. Department of State, 2022). Furthermore, they state, “[t]he U.S. Department of State is committed to preparing the next generation of diverse American leaders to succeed in a globalized economy and work across borders to address our world's most pressing issues” (U.S. Department of State, n.d., para. 1). This statement shows the United States government’s commitment to pursuing further internationalization through exchange programs (U.S. Department of State, n.d.). Evidence suggests that these initiatives have strengthened international relations and helped to build bridges between different cultures (McBrien et al., 2017).

## **2.5: Student Involvement in Exchange Programs**

Understanding the different motivators and barriers students have to think about when they want to go abroad for school is important to motivate more participation in exchange programs. The common motivators students describe are increased cultural awareness, confidence in traveling through foreign countries, stronger collaboration with students of different backgrounds, alongside the experience of a new environment and weather (Petzold & Moog, 2018). In addition, determining specific motivators for the students who historically participate less—notably men and students in STEM subjects—is important (Twombly et al., 2012). Some barriers that may disinterest one from enrolling in an exchange program are the monetary costs, foreign language, fear of missing key graduation requirements, plus the common fear of spending an extended period away from friends and family (Petzold & Moog, 2018).

### **2.5.1: Common Student Motivators**

Many students describe an increased cultural and self-awareness after participating in exchange programs. Increased awareness comes from the opportunity to fully immerse oneself in another culture. By doing so, students are able to discover a new language and culture more in-depth. These environments serve as an opportunity to reflect on themselves, engage in viewing themselves working abroad, and experience

new situations (Petzold & Moog, 2018). It is noted that surveyed students showed a decrease in neuroticism, along with an increase in openness and agreeableness (Petzold & Moog, 2018). Neuroticism refers to a personality trait characterized by emotional instability, anxiety, moodiness, and vulnerability to stress (Widiger & Oltmanns, 2017). Decreased neuroticism suggests that students involved in exchange programs displayed more emotional stability and resilience, and were less prone to anxiety or mood swings after returning home, which has become a motivator for students.

A study was conducted in 2021 with students from 3 public universities in Laos that participated in exchange programs from 2014-2019. A variety of survey questions and further semi-structured interviews were implemented with over 150 different participants. In response to a survey question about the perceived benefits from their study abroad experience 91.4% of respondents agreed their experience improved their “career prospect development”, “academic and professional development,” and “potential for international careers” (Sisavath, 2021). This notion was further proven during a MetLife survey brought up at a White House Summit in which 65% of interviewed fortune 1000 executives considered “global awareness” an important characteristic in the preparation of careers (Johnson, 2017). Increased job opportunities are attributed to the fact that individuals with international experience tend to exhibit traits such as high-risk taking, assertiveness, and mobility, which are highly valued by employers (Petzold & Moog, 2018). In addition to greater job opportunities, it is noted that innovation is built upon the foundation of diverse thinking, which is commonly shaped by different cultures, experiences, and perspectives (Shao et al., 2019). Seeking these opportunities has become a common motivator among students who recognize the career benefits that come with it.

According to Twombly et al. (2012), programs with heavy university support increased the percentage of students involved. Not only did it routinely lower costs by allowing for financial support, and lowered issues with academic scheduling, but it also allowed for better program fits (Twombly et al., 2012). An increase in support from universities helps students feel comfortable with potential class conflicts, as it is more likely to be resolved if the conflict occurs due to a school-organized program. Students feel as though strong reliable support throughout the exchange program can guarantee an on-track graduation (Petzold & Moog, 2018).

### **2.5.2: Common Student Barriers**

Understanding the barriers preventing American students from engaging in exchange programs is important when aiming to increase participation. Students fear missing home, or any benefits that come from being home, such as internships, financial ability, and possibly hindering their academic progress (Frisch et al., 2022). The most common barrier is the cost of traveling abroad (Petzold & Moog, 2018). There is the added expense of travel, housing, and living while paying regular tuition fees. The annual cost of participating in international education opportunities for U.S. students is \$35,705 (AAP Finance News Wire, 2013). Exchange program costs would typically be in addition to tuition costs, which average either \$13,594 for in-state, or \$45,317 for out-of-state engineering students (Bouchrika, 2023).

In addition, students fear the repercussions of their exchange program credits being not counted with degree requirements causing more costs with delayed graduation and a lack of job prospects as a result (Petzold & Moog, 2018). In the study completed in 2021 with Loas University, 75% of students had to delay their graduation due to a lack of credit recognition when they got back to their home university, causing the need for additional tuition payment.

In addition to the monetary cost, there are social costs of being away from friends, family, and the comforts of home. One current solution to homesickness is group-based exchange programs, which allow for a piece of comfort in an unknown environment, as opposed to participating in international programs alone (OST, n.d.-a).

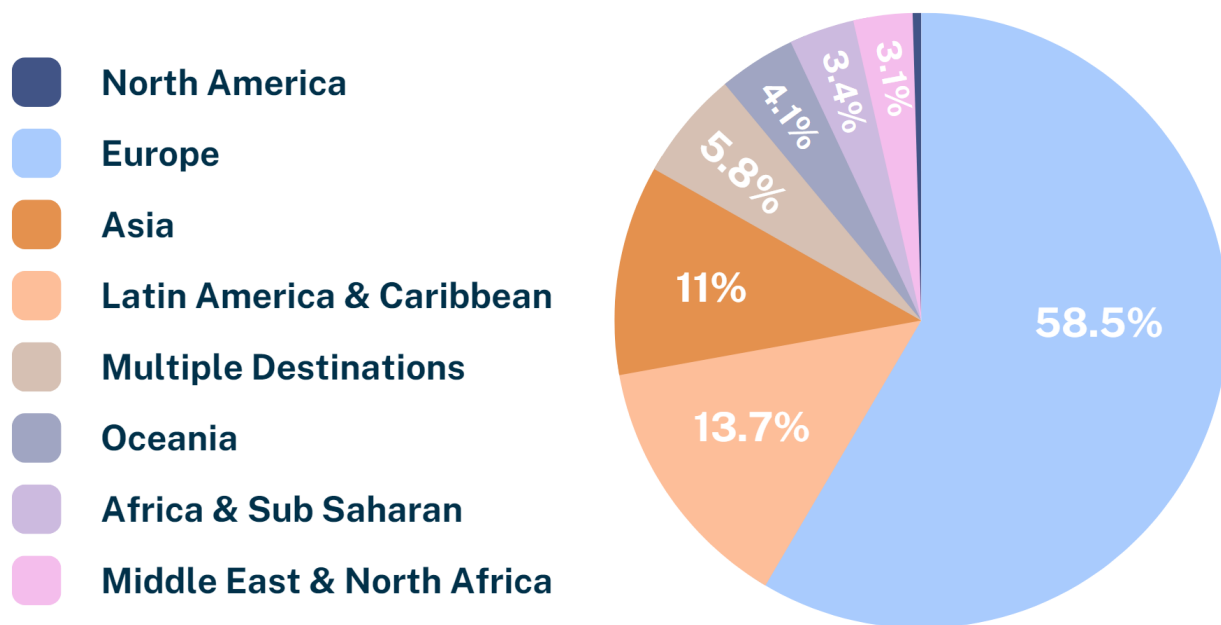
Another barrier for American students participating in international exchange programs is the potential requirement for foreign language proficiency. Based on the Open Doors Report (2022) by the Institute of International Education, nearly 60% of American students who participate in international education programs choose to go to Europe. While the primary language in the UK is English, the majority of the continent does not speak English as their native language. In the majority of cases, “certificates of foreign language skills,” or practice of the language, are required before travel can occur (Petzold & Moog, 2018, p. 39). Language skill requirement is especially important in engineering or computer science exchange programs due to the complexity of the concepts. For the exchange program to be effective and productive, students must



already moderately comprehend the technical language, or the host location needs to adapt to the influx of English-speaking students (Raubenheimer & Young, 2008).

**Figure 3**

*Host Regions of U.S. Study Abroad Students 2016/17 - 2020/21*



*Note.* Adapted with data from (IIE Open Doors, 2022).

### **2.5.3: Common Groups Who Historically Participate Less**

When considering increasing involvement in engineering exchanges, it is important to understand who is historically missing from exchange programs. According to Twombly et al. (2012), in the past decade, the percentage of men going abroad for schooling or being involved in exchange programs has consistently been around 34%. In a survey sent yearly by the University of California, Los Angeles, it is evident that females are typically more interested in study abroad programs than males (University of California Los Angeles, 2022). In the 2022 data set, 33.85% of the females surveyed said there was a “Very Good Chance” that they would participate in a study-abroad program in comparison to the 21.05% of males who said they would (University of California Los Angeles., 2022). As there is a lack of men attending foreign exchanges, it is critical to note that members of engineering and computer sciences programs are largely men, especially while looking to generally involve more students in an

engineering exchange program (University of Nevada, n.d.). This statistic and notion dictates that to increase engineering and computer science presence in exchange programs, it is important to identify the reasons for the lack of men. Through some studies, it was discovered that many male-identifying students fall under the “player or worker” category meaning they were either involved in a sport on campus or had a job that required them to be on campus (Twombly et al., 2012). Showing prior engagements on campus deterred many male-identifying students from going abroad. Additionally, some students view studying internationally to be associated with improving soft skills, which can be associated with women, leading to the perception of studying abroad or participating in international exchange programs as “a feminized vision” (Twombly et al., 2012, p. 52). Overall, these studies found that more targeted promotions towards providing viable reasons to leave family, friends, work, and play were necessary to potentially involve a more balanced distribution of students.

## **2.6: Historical Motivations for Promoting Internationalization in the U.S.**

Momentum for all exchange programs in the United States, not just study abroad, began after the Korean War in the 1950s and during the Cold War (Snow, 2008). A major concern was the image of the United States, and how the rest of the world was perceiving it after losing a war—not to mention that most of the world considered the United States a younger nation (compared to other countries). As a way of overcoming some of the stereotypes that other countries had about Americans and the United States, the government started pushing for exchanges, which also allowed the U.S. relationships with other countries to grow stronger. The U.S. also revived its push for international exchanges in the mid-70s after the Vietnam War “in the name of peace and mutual understanding” (Snow, 2008, p. 213) to ensure other countries did not think poorly of the United States. There was also another resurgence in exchange programs after the events on September 11th, 2001 to show that the U.S. was going to continue its trend of internationalization despite a devastating event that aimed to hinder their globalization effort (Snow, 2008). From the U.S. standpoint, exchanges seem to serve as a way to maintain a positive image and show the rest of the world that they are producing bright minds who are willing to work with those from around the world.

## **2.7: U.S. Institutions' Strategies for Exchange Programs**

U.S. institutions implement various strategies to encourage and support student participation in exchange programs from both organizations and universities. These strategies aim to address the common barriers found in these programs and enhance the motivators for students to participate in international exchange programs (Twombly et al., 2012). This section will discuss the approaches adopted by U.S. institutions to increase student involvement in exchange programs.

### ***2.7.1: Financial Support and Scholarships***

As explained previously, one of the primary concerns for students considering an exchange program is the cost. To address the issue of cost, some U.S. colleges and universities offer financial support and scholarships to eligible students participating in exchange programs. This financial support can include grants, scholarships, and financial aid packages that are specifically designed for study-abroad experiences (Bell et al., 2022). Institutions may also partner with external organizations or businesses to fund scholarships, reducing the financial burden on students and increasing accessibility to exchange programs (Bell et al., 2022). Programs and institutions like the Institute of International Education (IIE) help students find both programs and scholarships for programs all around the globe, IIE manages more than 200 programs for more than 180 countries for which any student can apply (IIE, n.d.).

### ***2.7.2: Promoting Exchange Programs and Expanding Partnerships***

Many U.S. institutions actively promote exchange programs and raise awareness about the benefits of studying in a new country. This promotion can include organizing international opportunity fairs, information sessions, and workshops, as well as sharing testimonials and success stories of alumni who have participated in exchange programs (Doyle et al., 2010). Institutions may also leverage social media and other digital platforms to reach a broader audience and showcase the various exchange opportunities available to their students (Hamilton et al., 2019).

### ***2.7.3: Pre-Departure Preparation and Language Support***

To help students overcome language barriers and better prepare for their exchange experience, many U.S. institutions often provide pre-departure preparation and language support. This preparation can include mandatory orientation sessions, language courses, or workshops that focus on cultural adaptation and practical skills needed for living and studying internationally (Berg et al., 2009). The duration of such programs depends on a few factors, including location of study, language of study, and the institution that is hosting the exchange. By offering such resources, institutions help to build students' confidence and language proficiency, increasing their chances of a successful exchange experience (Berg et al., 2009).

## **2.8: Case Study**

We reviewed a case study of an established exchange program with the set goal of identifying examples of best practices and understanding exchange programs in higher education institutions. This case study analysis provided valuable insights into the factors that contribute to successful international student exchanges, as well as areas that may require improvement. By examining real-world examples, it will be easier to better comprehend the challenges and opportunities that come with these cultural and educational experiences.

### ***2.8.1: Engineering Exchange Programs in Brazil***

This paper & case study highlights a group of eighteen students from both North Carolina State University & North Carolina A&T State University pursuing an exchange program with Universidade Federal do Rio de Janeiro and Universidade Federal de Juiz de Fora in Brazil (Raubenheimer & Young, 2008). In the program, students spent six months in Brazil taking engineering courses in Portuguese whilst immersing themselves in the culture of the cities they inhabited (Raubenheimer & Young, 2008).

In the study, they found several aspects that worked well and others that needed improvement in an international student exchange program. One positive aspect was that students became more aware of cultural differences when solving problems. The authors observed that students learned how different social perspectives, cultural

values, and contextual conditions could impact problem-solving approaches and their ultimate solutions.

Another positive outcome was that students gained higher confidence in their ability to work in multinational teams. However, there were some areas that did not work as well. For instance, students did not feel prepared to learn in Portuguese, and the authors suggested that faculty should stress the importance of learning the language sufficiently before embarking on the exchange.

Regarding potential improvements, the general preparation and logistics of the program could be enhanced. A notable suggestion proposed by the students was the implementation of a mentor program. This program would involve experienced exchange students showing and imparting their knowledge and experiences to new participants at the end of their tenure in Brazil. The mentor program would help new students acclimate more quickly and successfully to their new environment with the help of prior exchange program students.

## **2.9: Summary**

Overall, students involved in exchange programs grow in virtually all aspects of their lives, with increased job opportunities, better adaptability, problem-solving skills, self-confidence, and increased cultural awareness in both individual situations and group assignments. Despite these advantages, currently, there is a low percentage of STEM students involved in exchange opportunities abroad. The Swiss Exchange team, in collaboration with OST, aspires to increase the participation of engineering and computer science students in exchange programs at OST.

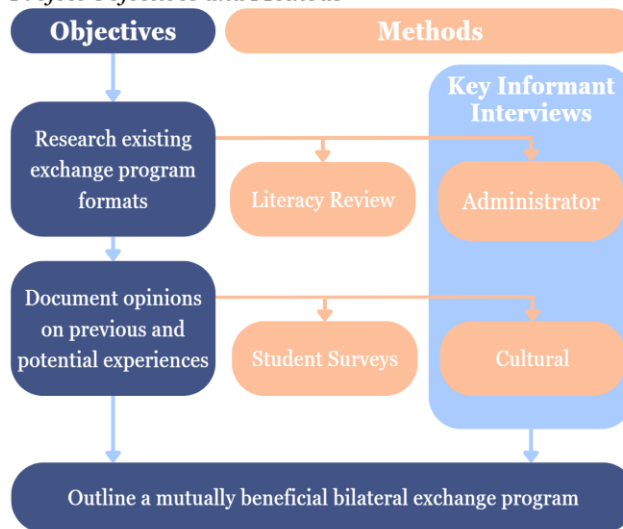
## Chapter 3: Methodology

There is a desire to incentivize the participation of U.S. engineering and computer science students in OST exchange programs. We achieved this goal we:

- 1) identified and researched existing exchange program frameworks to specifically highlight what is working within these programs along with potential new opportunities;
- 2) documented the opinions of engineering and computer science community members on potential and previous experiences studying in foreign countries; and
- 3) outlined implementation of a mutually beneficial exchange program that promotes bilateral interactions within the STEM field and strengthens internationalization, specifically between OST and WPI.

**Figure 4**

*Project Objectives and Methods*



In this chapter, we describe, explain, and justify the methods we used to reach these various objectives in collaboration with OST.

### 3.1: Research Existing International Exchange Programs

There is a limited number of already established exchange programs for STEM students in the United States, with less than 15 % of students studying Engineering abroad in 2020-2021 (Statista, 2022). Exchange programs are incredibly relevant in the engineering field as diverse backgrounds allow for problems to be approached from unexpected angles (Paris, 2023). This is supported by studies showing that diversity and adversities increase innovation in addition to international competency. International

competency is a sought-after characteristic that causes 40 % of companies to miss out on international business opportunities (NAFSA, 2019). This is the ability to communicate and collaborate with persons from different backgrounds (Leung, Ang and Tan, 2014). In addition to few opportunities, students face many barriers such as language competency, financial burdens, credit transfer issues, and academic layout differences (Petzold & Moog, 2018). Understanding opportunities that already exist for other STEM students allowed us to adapt these programs for OST to increase the opportunities for U.S. STEM students.

We conducted a key informant interview with our sponsor, Ms. Schreiber, to determine the expected outcomes of this exchange program. This allowed us to identify potential programs or partnerships, and gain an understanding of what has already been implemented at OST, its strengths, and its weaknesses. We researched multiple case studies on universities with engineering programs and/or conducting exchange programs found through Google and other educational databases: Education Resources Information Center (ERIC) and Journal Storage (JSTOR). During the first two weeks, in addition to searching databases, we also researched the National Association of Foreign Student Advisers (NAFSA), and the Washington Accords to learn about practices for conducting international education and receiving transfer credits. Using multiple methods, such as this literature review and key informant interviews, improved the scope and relevance of our research and allowed for greater confidence in the information received (Homburg, Klarmann, Reinmann, & Schilke, 2012). To analyze the data collected from key informant interviews, we employed a combination of coding and thematic analysis, in line with the recommendations of Johnny Saldaña (2016) and Braun and Clarke (2006). We were able to identify codes that emerged from the data while also interpreting the interviews linguistically allowing us to gain a larger scope of concepts related to international exchange and internationalization.

Our approach is different from typical exchange administrators. As engineering students from the U.S. placed in Zurich for the duration of our project, we understand the barriers and academic desires students may face. In addition, we had the unique experience of entering Switzerland as foreigners with minimal language capabilities or knowledge of the culture. This allowed us to uniquely tailor the program recommendation to satisfy American students' needs with a knowledge of what

preparations would be helpful, such as foreign language classes, culture studies, and support systems. Through interviews with university administrators, we determined this approach is different from typical exchange administrators who focus first on partnerships with universities discussing credit transfers and tuition costs as opposed to assimilating the students into the universities. In addition, some schools offer a relaxed support system for students which makes it more difficult for students to integrate into a new environment and culture.

Data was collected on a school-by-school basis across the U.S., and we were able to sort it by specific engineering majors and other science disciplines, by region, term setup, and more. This made it more versatile to both OST and U.S. universities looking to broaden opportunities for their students. There were no direct risks in this method as it was mostly research; however, maintaining multiple sources for key informant interviews and literary reviews was important to cross reference information received.

### **3.2: Document Opinions of STEM Students on Exchange Programs**

When working with OST to solve the primary issue of low participation rates among American STEM students in international exchange programs, we obtained a collection of baseline assessments by surveying American engineering and computer science students (Appendix A & B). We created a mixed-method design to receive quantitative and qualitative data from multiple sources that provide actionable insights for OST. This allows them to better tailor their programs both operationally and socially for American STEM students (Bhattacharjee, 2012; Creswell, 2014).

Our surveys uncovered general trends and opinions about what American STEM students are looking for in an exchange program. Specifically, we gathered ordinal, nominal, and discrete data while administering surveys through Qualtrics under a WPI license. These surveys were sent over email after gaining access to students' contact information by asking different department heads and university administrators for permission. We also promoted our surveys using our social media and Slack to capture a diverse range of student opinions across the U.S., we gained insights from 20 different universities across 11 different states.

Unlike other studies that focus solely on one type of data, our mixed-method approach combines broad survey data with comprehensive interviews. This uniquely



gave us the largest possible understanding of American STEM student sentiment regarding foreign exchanges. These methods were chosen based on their ability to provide a more comprehensive view of American STEM students' sentiment, as supported by the work of Tashakkori and Creswell (2007) on the efficiency of mixed-method designs.

Our analysis was performed using statistical software in Python, focusing on splicing and cleaning the data directly from Qualtrics. This included normalizing certain categorical variables and restructuring data to better suit our analysis (Bhattacharjee, 2012). Our analysis employed a range of statistical techniques to identify trends, relationships, and patterns within the data. These included descriptive statistics, regression analysis, and hypothesis testing, among others to fully understand the nature of our data in a numerical sense. Furthermore, we used sentiment analysis through natural language processing in Python using the Natural Language Toolkit (NLTK) on our surveys and our interviews to find common sentiments and feelings throughout all our data (Bird, Klein, & Loper, 2009). This allowed us to categorize students' responses into emotional states such as positive, negative, or neutral, giving us more subtle insight into the prevailing attitudes within our data. Our numerical and categorical approach to data collection from both interviews and surveys is unique to this specific field and employs the aforementioned mixed-method design to our methodology.

The risk in our methodology was the potential for group-response bias. Since we are a group of students from WPI, we received a higher response rate from WPI students due to our resources and connections to our institution. To mitigate this, we kept the survey open for an extended period and employed various channels for promotion to other schools including using the Kern Entrepreneurial Engineering Network (KEEN) and personal connections to other engineering departments at other schools, such as the University of California Berkeley, Missouri University of Science and Technology, and Wake Forest University.

Our mixed-method approach leveraged both qualitative and quantitative data to provide an understanding of American STEM students' views on international exchange programs. While acknowledging limitations such as potential group-response bias, we took steps to mitigate these risks and increase the diversity usability of our findings. Through rigorous data collection and analysis, our research aimed to provide actionable

insights that can be used to increase the participation rates of American STEM students in international exchange programs.

### **3.3: Proposal of a Mutually Beneficial Exchange Program**

In order to fully implement a bilateral STEM exchange program at OST with the goal of strengthening internationalization, we found how to effectively and efficiently do so. The issue we aimed to solve was the scarcity of successful engineering exchange programs that bring U.S. students abroad. In the 2020-2021 academic year, only 14.4% of students studying in another country were engineering students, showing a scarcity of programs in the U.S. that promote engineering exchanges, highlighting the importance of this research (Statista, 2022). Engineering thrives on collaboration (Cummings & Kiesler, 2008), yet there is a lack of exchange programs in the U.S. allowing students to travel internationally for school, despite the clear benefits of cultural experiences in enriching the scientific process (Lohmann, Rollins, & Hoey, 2006).

We conducted additional key informant interviews with multiple stakeholders to understand their perspectives on the data gathered from sections 3.1 and 3.2 to be conscious of the operational structures behind an exchange program. We used a new approach by interviewing a diverse set of professionals, enabling us to compile a multifaceted view of what programs are doing well and what could be improved. We conducted interviews with international exchange experts (Appendix H), individuals who have moved and lived in Switzerland for an extended period of time (Appendix D), and administrators from both WPI (Appendix F) and our sponsor, OST (Appendix C). The reason for this method lies in its ability to capture detailed insights from different sectors of academic, professional, and personal life.

Our initial cohort of interview participants comprised a diverse array of stakeholders from OST and Switzerland as a whole, including academic administrators and international program coordinators. To enrich our data set with perspectives on cultural acclimatization, we expanded our interviews to include a Zurich-based entrepreneur who had relocated from Canada, Appendix E. Additionally, we specifically selected a second group of interviewees from WPI. These individuals possess unique expertise in orchestrating large-scale international programs on an ongoing basis. This

group included IQP advisors, program directors, and staff from WPI's Office of Integrative & Global Studies.

We used the knowledge gained in these interviews to better understand how successful bilateral exchange programs are implemented sustainably and operated from the perspective of both WPI and OST administrative groups. Qualitative data analysis followed methods similar to those described in section 3.1, as well as strategies developed based on insights from interviews to provide recommendations to improve OST's exchange programs.

Please see survey guides in Appendix A and B.

Please see the interview guide in Appendix C, D, E, F, G, H, and I.

## Chapter 4: Results and Analysis

Holding interviews with WPI and OST administrators, surveys with U.S. STEM students, and literature reviews about the designs of current engineering exchange programs gave us multiple viewpoints on how to pursue the ideal exchange program to encourage students to participate.

Through our surveys, we understood more about the patterns seen at WPI and other schools regarding desires to study in foreign countries along with potential incentives for all STEM students. This ultimately helped us complete our second objective which was to document opinions on previous and potential experiences. Additionally, interviews with Professor Nancy Burnham and Mr. David Court gave us insight into their opinions on Swiss culture that they had previously experienced moving to Switzerland.

Through our interviews with university administrations, we were informed of factors that were crucial in making good recommendations for our project which led to more background research. These include the European credit system, standard calendar year, a number of already established exchange programs, and OST-specific admission requirements and learning formats.

After completing objectives 1 and 2, to research existing exchange programs and documenting the opinions of STEM students, we were able to efficiently work on our third objective to gain insight into how to initiate new international partnerships, integrate new students, and the challenges involved in global programs. With this information, we formed initial recommendations for our proposal and met with university administrators and experts to get feedback for further revisions.

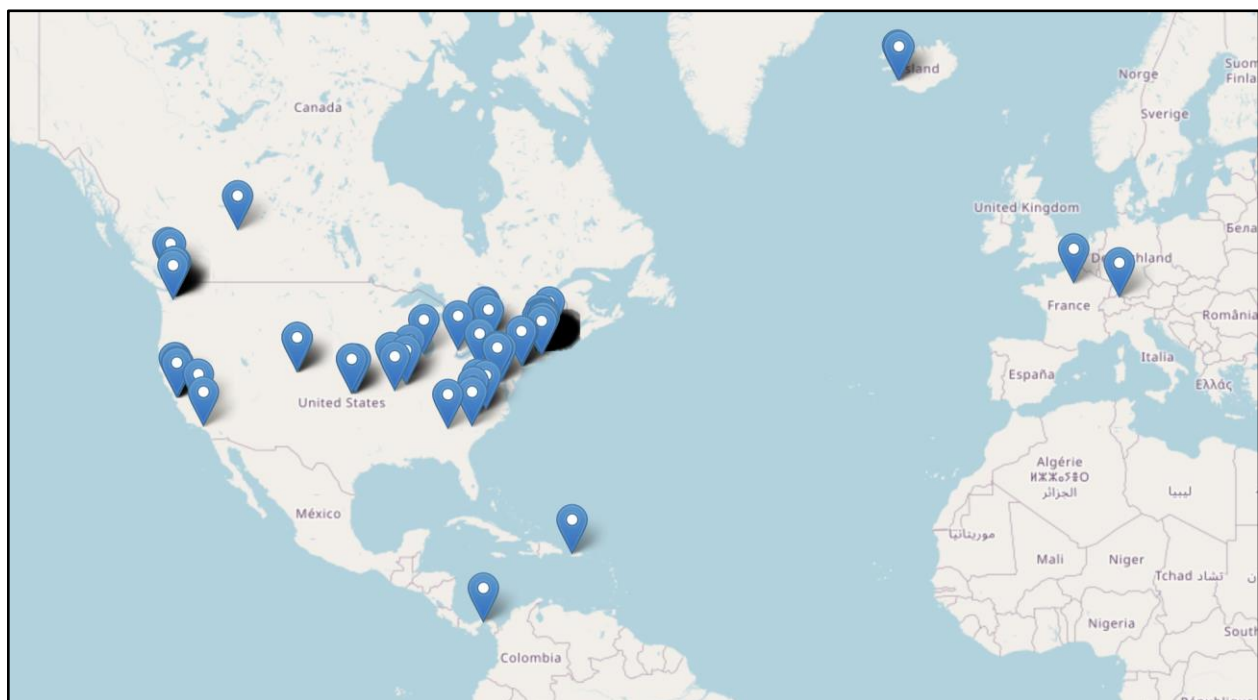
### 4.1: Survey Findings

Our surveys reached students at 20 universities across the United States, this gave us confidence that the results we received were without bias as universities have different exposure to exchange programs. For example, some responses were from Syracuse University in which students take classes from an auxiliary Syracuse campus in a foreign country where classes are part of their original curriculum (Syracuse University, n.d.). Other responses from Northeastern University (NU) have a strong

cooperative education (co-op) program with a participation rate of 95.2% that has been ongoing for over 100 years (Northeastern University, n.d.-a). NU students are given the chance to complete this six-month co-op in different locations throughout the U.S. and in more than 100 countries. Bias from NU students will be shown through the data due to this exposure (Northeastern University, n.d.-b). In other situations where their universities did not offer programs, students participated in a Council on International Educational Exchange (CIEE) study abroad program separate from their home university (CIEE, n.d.).

### Figure 5

*Locations Where the Survey for U.S. STEM Students About Foreign Exchange Programs (Interest/Non-Interest and Experiences) Was Taken*



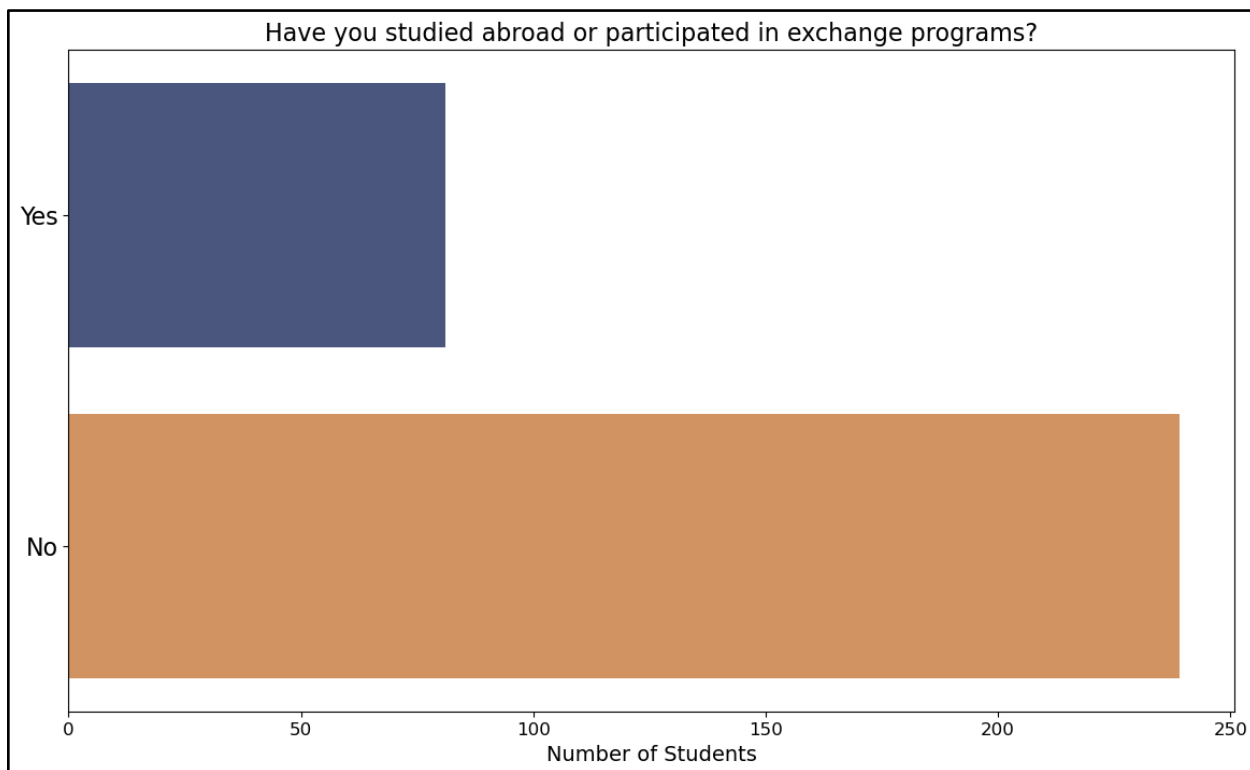
#### **4.1.1: STEM Students on Studying Abroad**

We hypothesized that WPI students would have an increased desire to study abroad in comparison to other universities because of WPI's curriculum structure which includes having the IQP. Through these surveys, it was proven that this desire for going abroad was still prominent at other universities. Based on the responses we received, we

noticed no distinct differences between the opinions of WPI students and other university students. The exception was between students who have had the opportunity to study abroad and those who have not.

**Figure 6**

*U.S. STEM Students Who Have Gone Abroad for School vs. Those Who Have Not*



This result confirms our background research documenting that many STEM students do not participate in global experiences in the form of exchange programs or studying abroad. When comparing WPI students and other university students, we noticed that 81.1% of other university students have not studied abroad compared to only 70.9% of WPI students.

**Table 1**

*Students Who Have or Have Not Studied Abroad or Participated in an Exchange Program, Organized by University and Year of Study*

	Other Students		WPI Students	
	Yes	No	Yes	No
1st year	6	36	0	9
2nd year	7	28	0	17
3rd year	7	28	8	29
4th year	7	15	12	5
5th year	5	7	2	0
Post-grad	16	54	3	1
<b>Total</b>	<b>48</b>	<b>205</b>	<b>25</b>	<b>61</b>
<b>Percentage of Total</b>	<b>18.9%</b>	<b>81.1%</b>	<b>29.1%</b>	<b>70.9%</b>

This table shows whether or not students have studied abroad or participated in exchange programs. The information is sorted by WPI and other universities to see the difference in experiences. It is evident that there is a higher rate of WPI students traveling abroad for school, with 29.1% overall of WPI compared to 18.9% overall of other universities. This result is most likely due to WPI's curriculum that requires students to complete an IQP, commonly completed abroad. Since this experience is embedded into the curriculum, students do not have to fear delaying graduation.

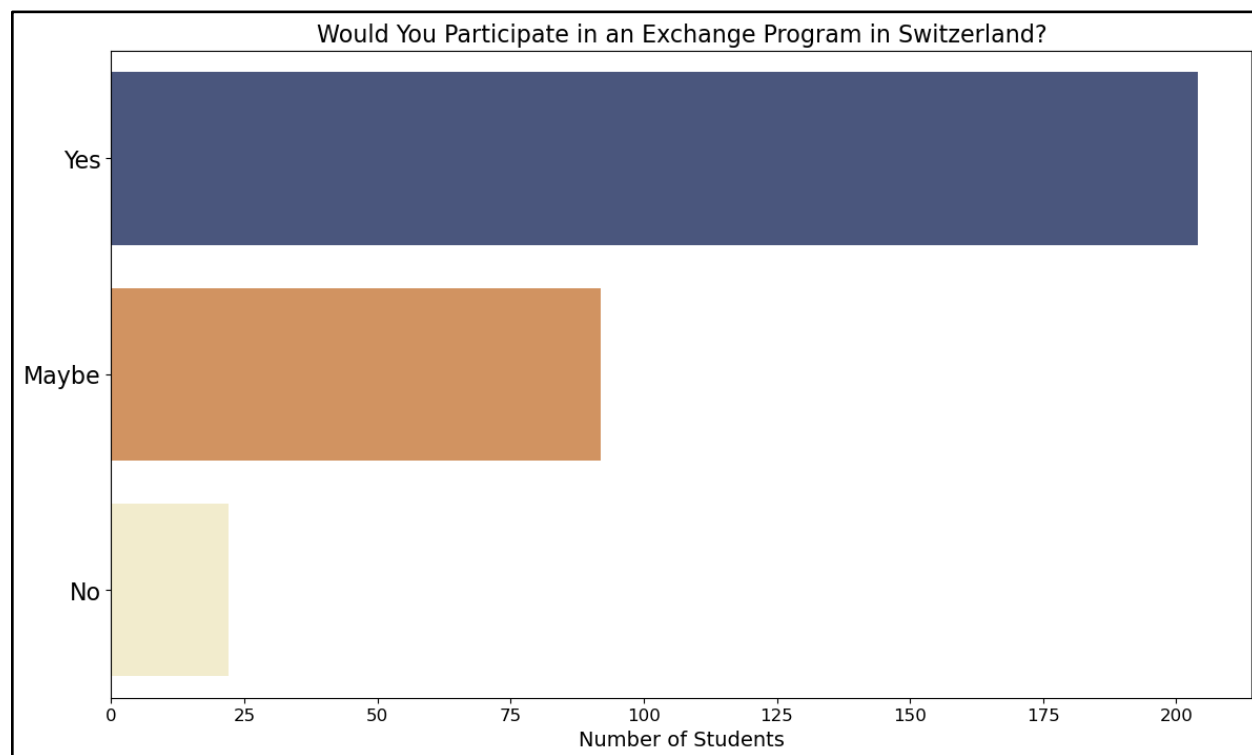
Since students do not typically have the opportunity to study abroad or go on an exchange program in their early undergraduate careers, we calculated the rate of them going before and after their sophomore year. At universities other than WPI, only 19.9% of students who have already completed their second year have gone abroad, compared to WPI's rate of 41.7%. It is important to note this survey was taken in August of the

academic year, so students may study abroad later in the year but the survey reflects otherwise. At WPI, 0% of first and second-year students have gone abroad, which is most likely because IQP and other exchanges are typically completed in their later years. At other universities, however, 20.3% of first and second-year students went abroad. After further looking into this, we noticed all of those students attend Northeastern University, which has a strong international cooperative education program, thus skewing the data. At every other university, 0% of first and second-year students have gone abroad.

Despite the significant difference in participation, we further wanted to understand if there are students specifically not interested in exchanges or studying abroad in Switzerland.

### Figure 7

*Those Who Would Consider Traveling to Switzerland for School (All Schools)*





These results show there does not seem to be a disinterest in participating in exchange programs, and as we further observe the data split between students not at WPI and WPI students, this continues.

**Table 2**

*Number of Students Who Would Study Abroad or Participate in an Exchange Program in Switzerland*

	Other Students	WPI Students	<b>Total</b>
Yes	153	51	<b>64.1%</b>
Maybe	60	32	<b>28.9%</b>
No	19	3	<b>6.0%</b>
<b>Total</b>	<b>232</b>	<b>86</b>	
<b>Total Yes Percentage</b>	<b>65.9%</b>	<b>59.3%</b>	

After comparing the percentage of WPI and other students who answered “Yes” to the question, similar rates are found with 59.3% and 65.9% of students interested, respectively.

We can also see this broken down by WPI and other students, where other students are slightly more likely to consider going to Switzerland. While it seems that other university students are more interested in Switzerland, the majority of those responses were completed by Northeastern students. Due to their already established co-op program, going abroad is common among their students, which might explain why students from other universities are more interested than WPI students.

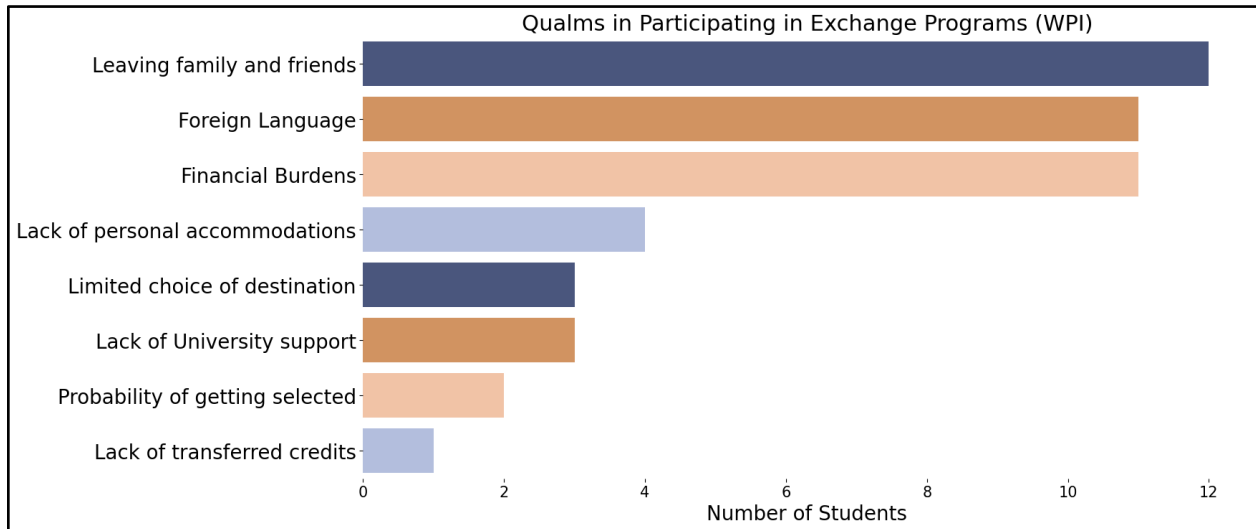
This question was a hypothetical question posed to all STEM students, and overall, we received the response that students are willing to consider an exchange in Switzerland. This outcome suggests that the reason they don’t participate comes down to external factors. In the written responses, students who answered “no” documented financial barriers in both cost of living and tuition, while the students who selected

“maybe” wrote qualms with potential credit transfer issues and lack of available programs.

**4.1.2: Student Motivators or Deterrents**

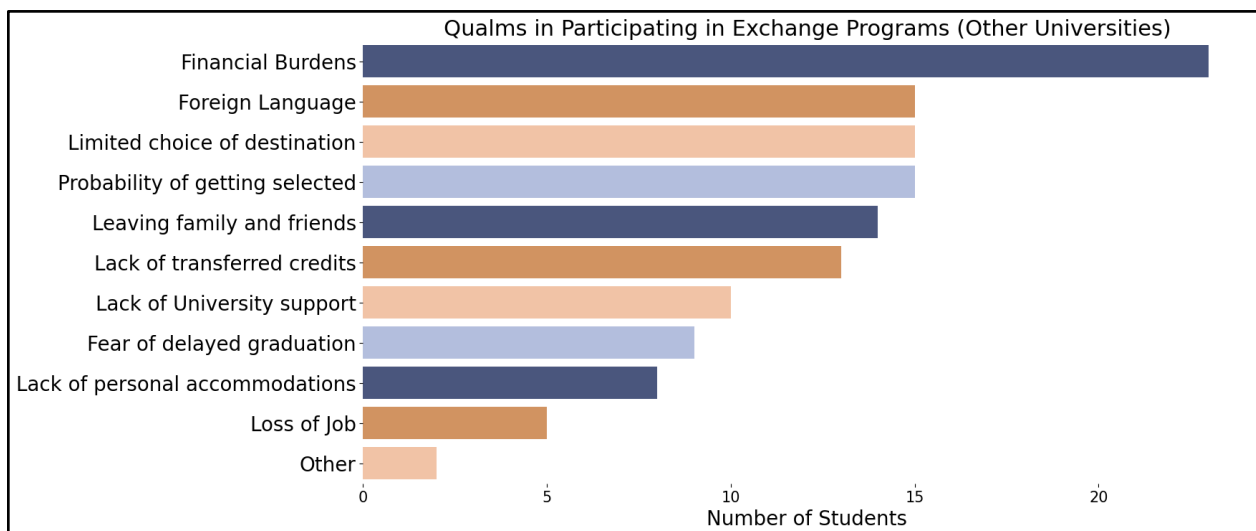
**Figure 8**

*Hesitations Students Had Prior to Traveling Abroad for School (WPI)*



**Figure 9**

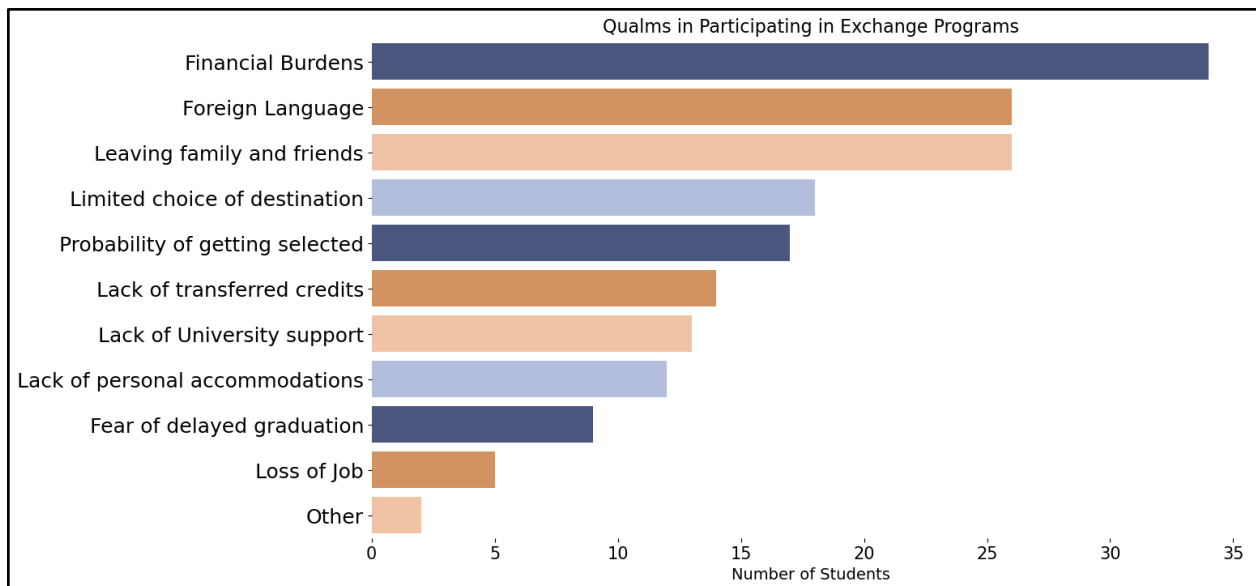
*Hesitations Students Had Prior to Traveling Abroad for School (Other Universities)*



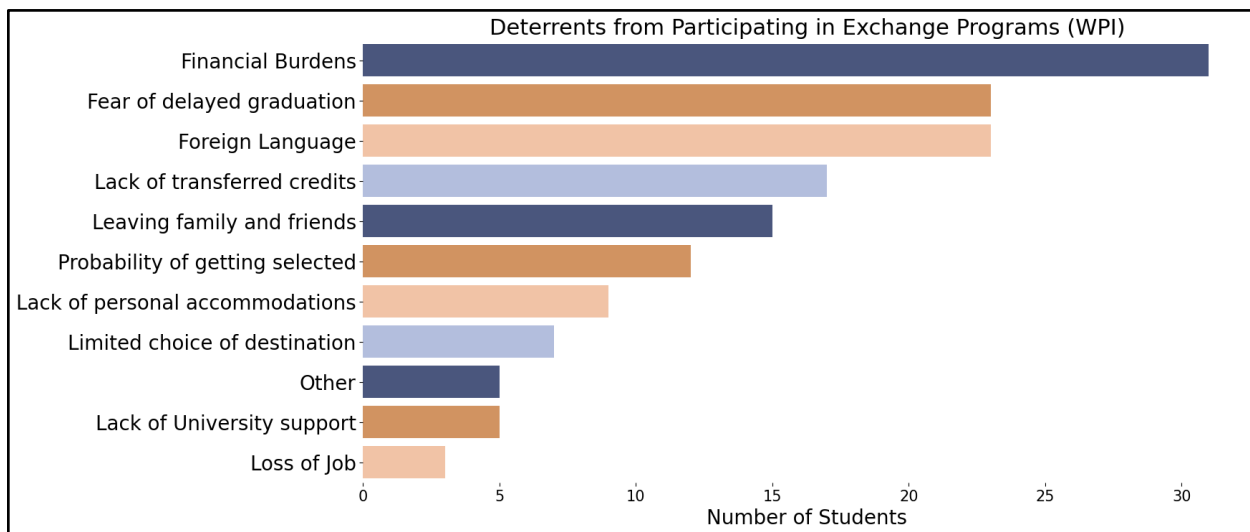
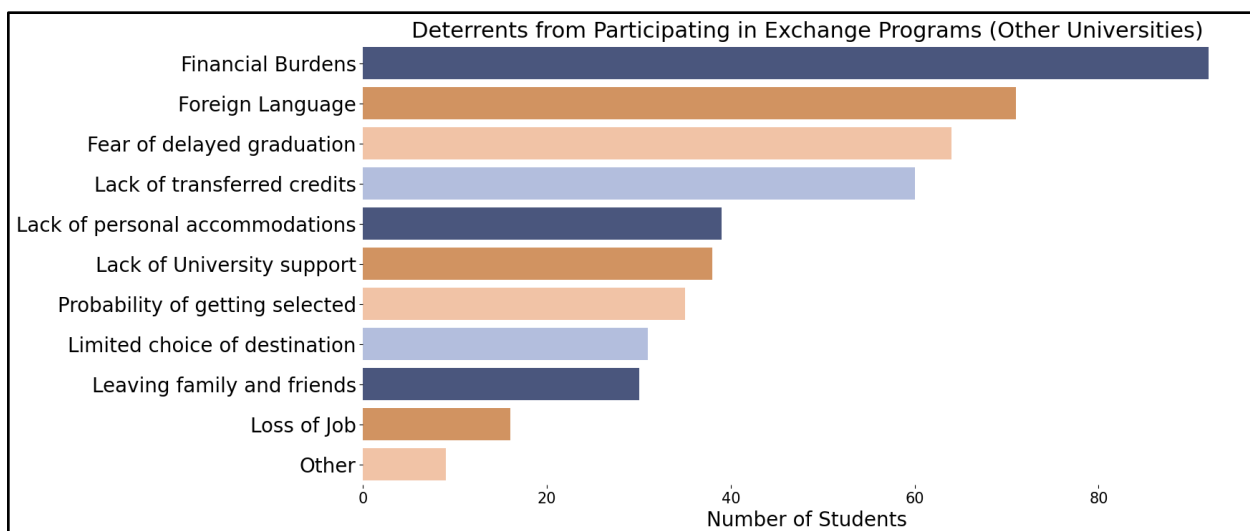
When looking at qualms students had prior to departing for an exchange program separated between WPI and other students, we noticed students from other universities had more fears about logistical issues like limited choice of destination and probability of program selection. This can be attributed to the difference in curriculum structure in which WPI students choose from a list of almost 100 destinations selecting a minimum of 6 “interested and very interested” locations and administration must place students in one of the selected. This is compared to other institutions where applications must be filed for each destination and a complete rejection from the exchange program is possible. When observing the data of all STEM students the qualms differ.

**Figure 10**

*Hesitations Students Had Prior to Traveling Abroad for School (All Universities)*



In this dataset combining all universities the pattern of common qualms returns to financial burdens, preference or requirements of foreign language knowledge, and worries of leaving friends and family.

**Figure 11***Reasons Students Have Not Gone Abroad for School (WPI)***Figure 12***Reasons Students Have Not Gone Abroad for School (Other Universities)*

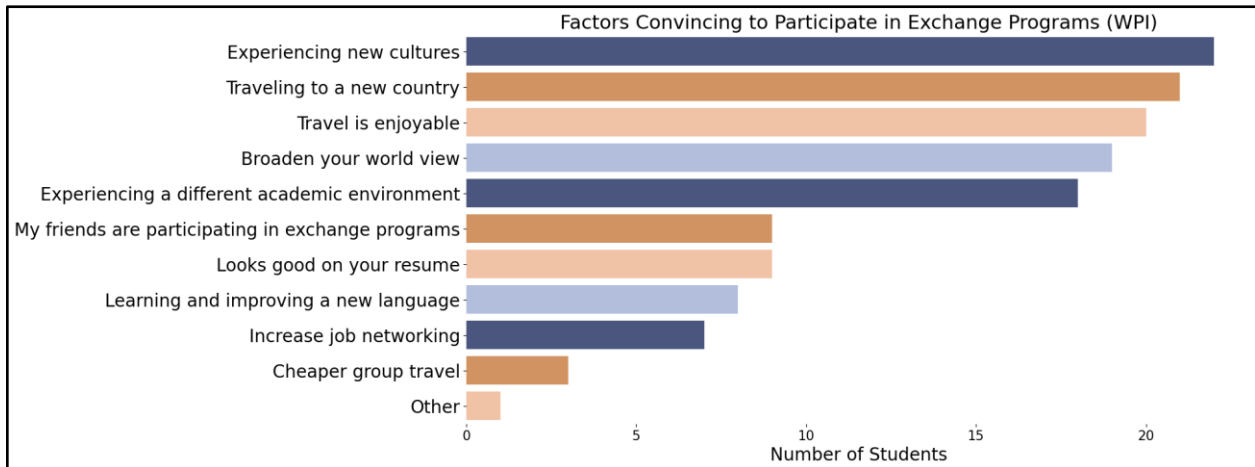
It is clear that financial burdens are a significant factor for students in deciding if they can or should participate in exchange programs. Evidently, this is the largest factor, especially for the students who have not participated.

The lack of knowledge of the foreign language also aligns with all students. This means students want to comprehend the languages that are spoken around them, in addition to fear of studying in a foreign language if English is not offered.

The third most common reason students ultimately decide not to travel abroad for school is because of delayed graduation. This is a big deal for students in the U.S. since tuition prices within the U.S. are higher than tuition prices in Switzerland, which can be seen by WPI’s tuition of roughly \$57,960 (Worcester Polytechnic Institute, 2021) compared to OST’s tuition of roughly \$2,000 (OST, n.d.-b). WPI’s tuition is almost 29 times more expensive per year, proving why U.S. students are fearful about not graduating on time.

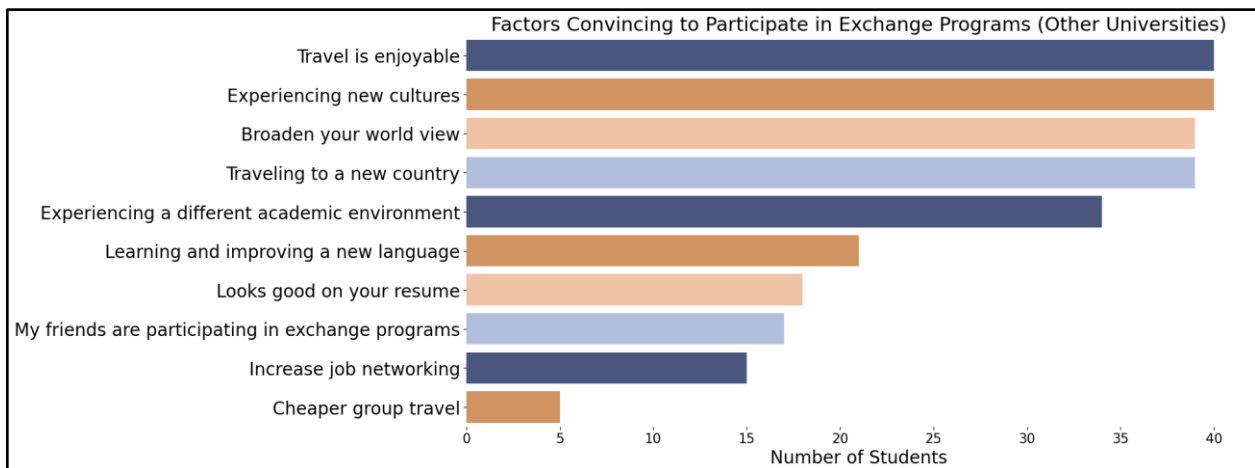
**Figure 13**

*Factors That Contributed to Students Traveling Abroad for School (WPI)*



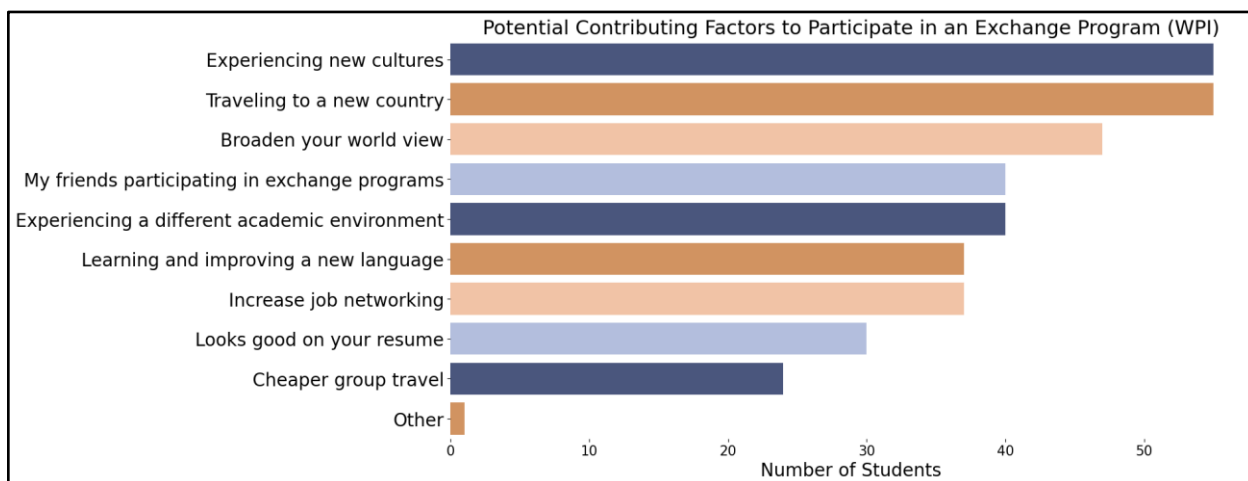
**Figure 14**

*Factors That Contributed to Students Traveling Abroad for School (Other Universities)*

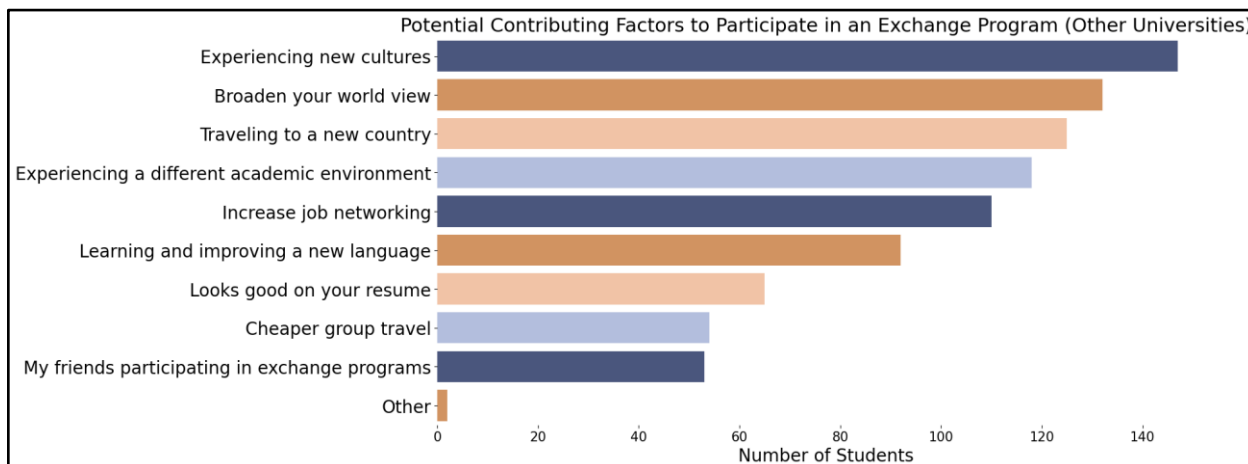


**Figure 15**

*Factors That Would Convince Students to Travel Abroad for School (Who So Far Have Not) (WPI)*

**Figure 16**

*Factors That Would Convince Students to Travel Abroad for School (Who So Far Have Not) (Other Universities)*



Many students are drawn to studying abroad or participating in an exchange program because it gives them the opportunity to experience a new culture, broaden their worldview, and travel to a new country, all of which are top reasons in both categories. In our background research, we anticipated that a factor in a student's decision to go abroad was the ability to use it for resume building; however, this data shows it is not as important as we originally thought. It is also important to note that

WPI and other students have similar reasons to go abroad, even though they have different opportunities and exposure to abroad or exchange programs.

#### 4.1.3: Program Logistic

**Figure 17**

*Preferred Languages for Exchange Program Courses*

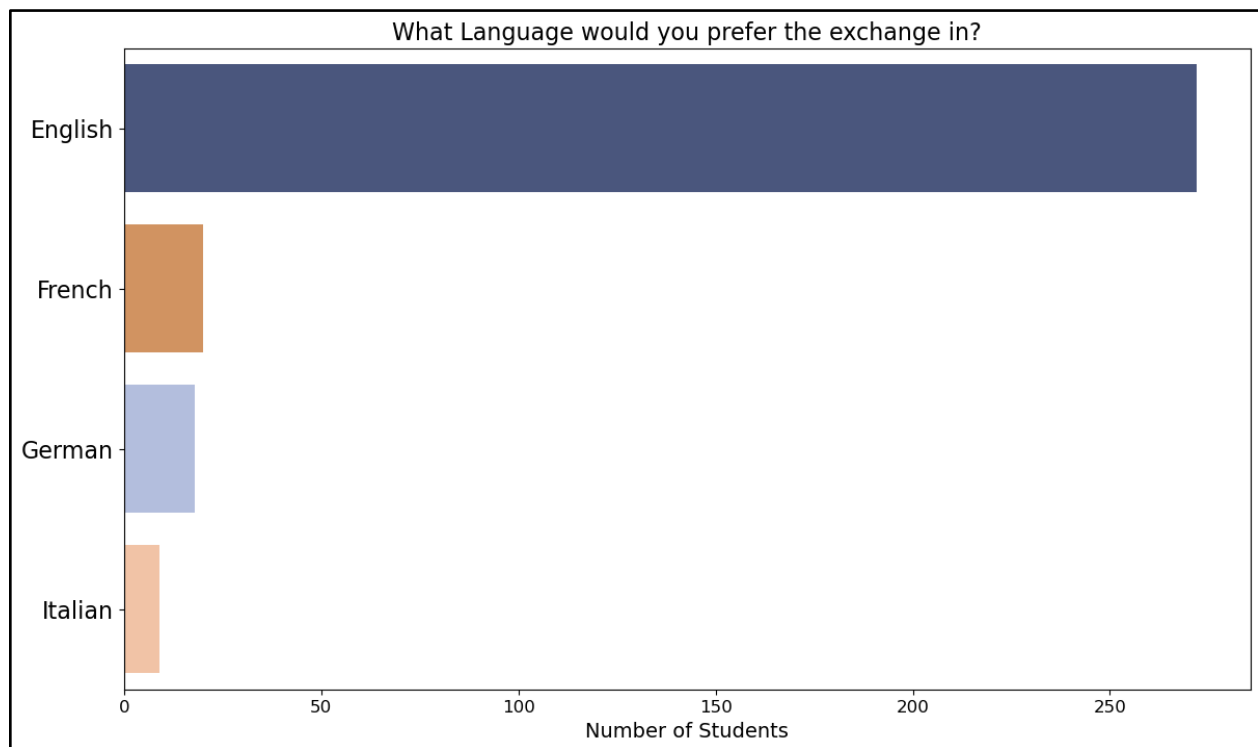
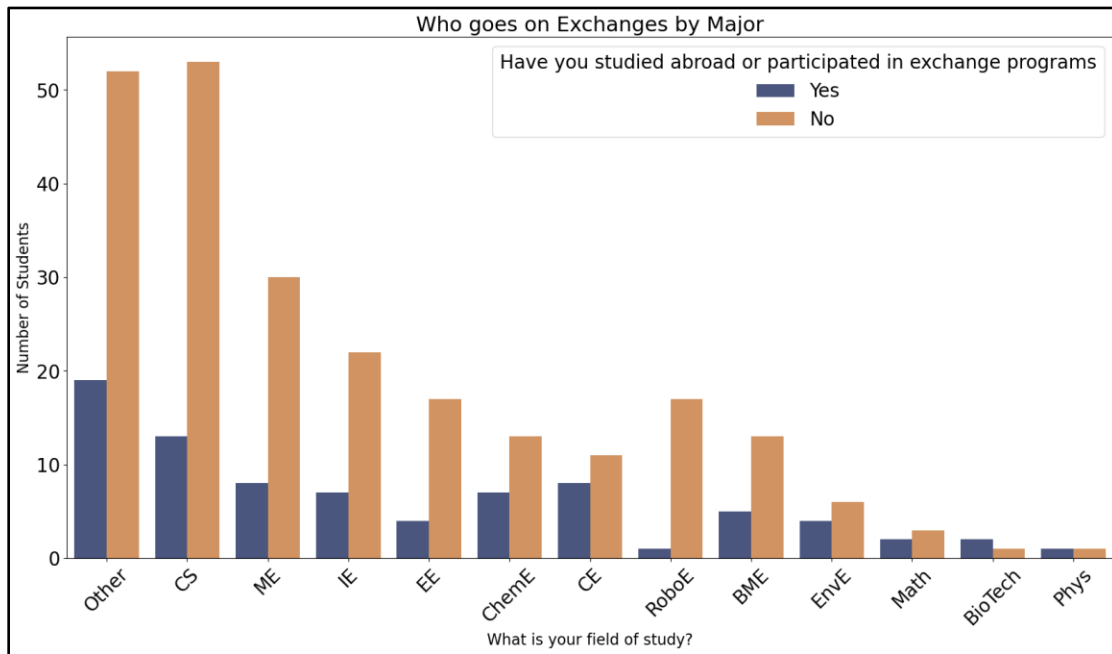


Figure 14 makes it clear that to attract more U.S. students, courses need to be taught in English. 86.26% of students who were surveyed said they would prefer the exchange program to be in English. Studies show that only 7.5% of U.S. university students study a foreign language during their college career since universities have begun dropping those requirements (Stein-Smith, 2023). This can be attributed to English becoming the global language as it is the “leading language in business, technology, science, Internet, entertainment and even sports”(Nunan, 2001). To accommodate this and more international students, major-specific classes need the option to be taught in English.

**Figure 18**

*The Field of Study Compared to Who Has or Has Not Participated in a Study Abroad or a Foreign Exchange*

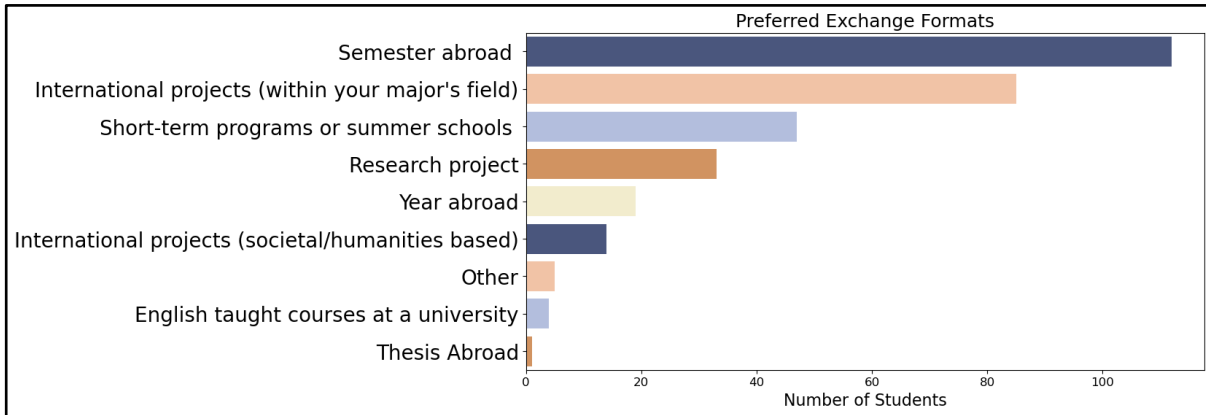


The findings from this specifically outline which majors have opportunities to study abroad in addition to which classes would need to be modified to allow for more exchange students. For example, it is shown that there are many Biomedical Engineering (BME) and Robotics Engineering (RoboE) who have not been able to study abroad, so in order to attract them, more classes aimed at their field of study should be opened up. The data also provides more information on which departments to reach out to at a university in order to gain more students in those fields.



**Figure 19**

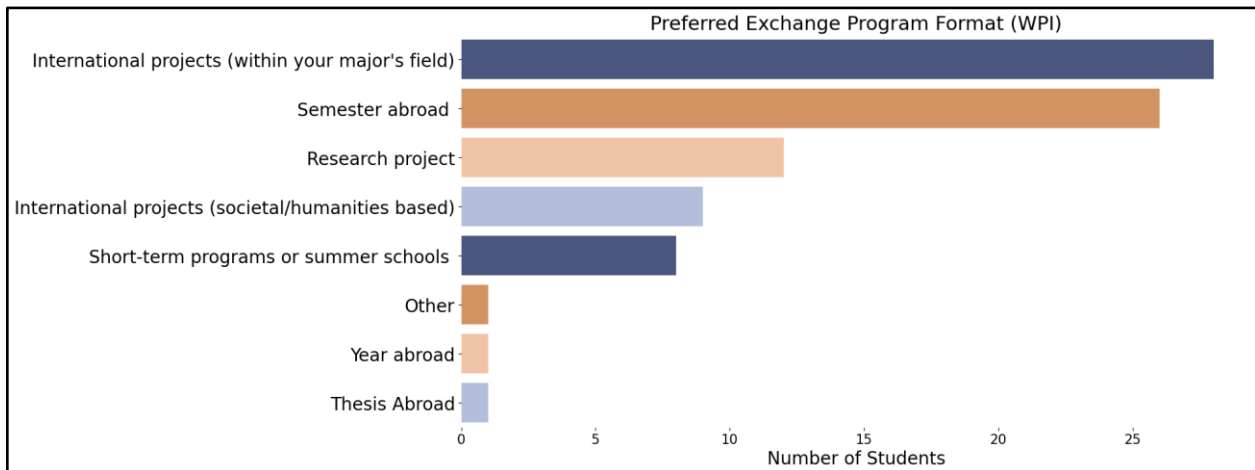
*Preferred Format for a Foreign Exchange Program*

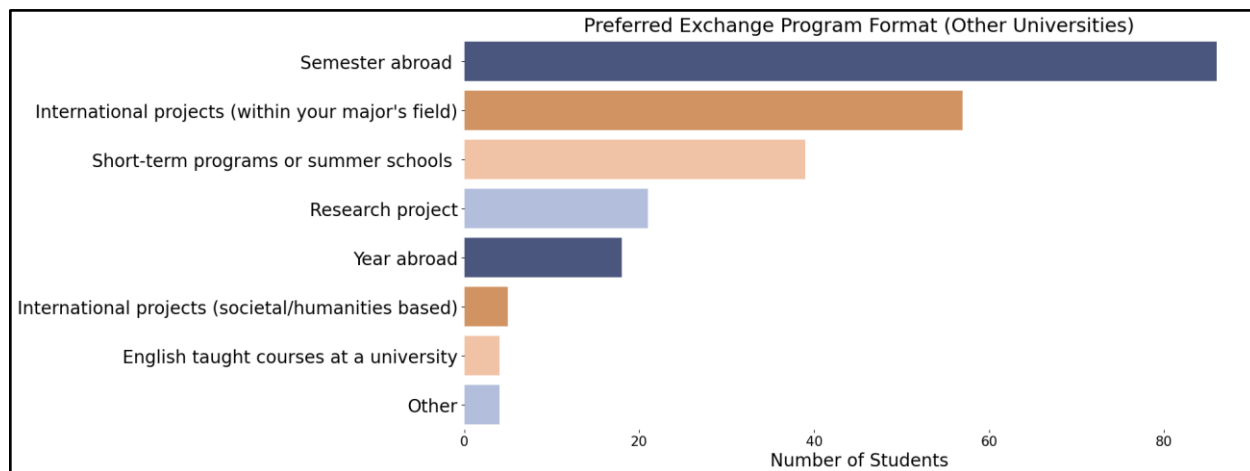


In a potential foreign exchange opportunity, the majority of STEM students prefer a semester abroad style or an international project within their major’s field. This data can further be broken down by WPI and other students to understand the difference in preferences based on the school curriculum.

**Figure 20**

*Preferred Format for a Foreign Exchange Program (WPI)*



**Figure 21***Preferred Format for a Foreign Exchange Program (Other Universities)*

Our hypothesis that WPI students seem to prefer an international project within their major's field is proven, as it aligns with their current curriculum, specifically the Major Qualifying Project (MQP). The MQP is a WPI graduation requirement similar to a senior capstone project in which students work on a major-specific project for 3-4 terms. The second leading preference for WPI exchanges and the leader for the other universities is a semester abroad, making it the top choice amongst all students. It is important to note that this statistic is greatly skewed due to WPI's project-based learning style, in which 2 major project-based classes are required for graduation: the IQP, and MQP. Without this, other exchange formats may have been among the top two preferences such as the short-term or summer programs.

The largest distinction between a semester abroad and an international project would be the collaboration aspect with students. The typical semester abroad signifies enrolling in a foreign university and taking classes while a typical IQP/MQP is done with students from the host university. Students who put "other" were looking for a term abroad, following the WPI "term system," which would be similar to the semester abroad format, but of a shorter duration. The WPI system involves 4 terms each lasting 7 weeks: A, B, C, and D terms.

## 4.2: WPI Global Survey Findings

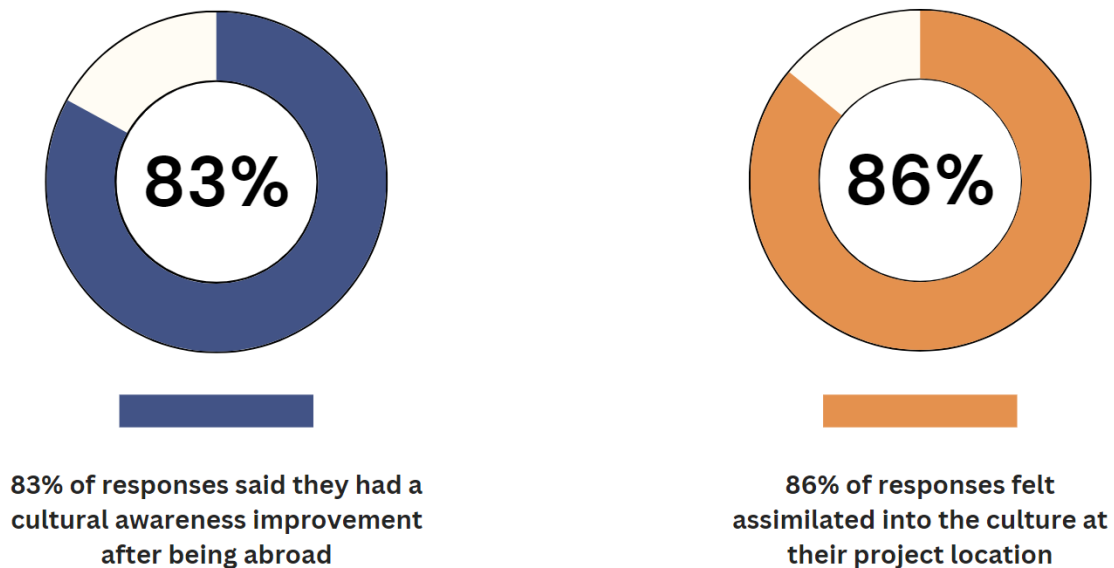
In this section, we surveyed WPI students who participated in a global WPI project either for their Interactive Qualifying Project (IQP), their Humanities and Arts (HUA), or their Major Qualifying Project (MQP) in order to learn more about how going to a new location affects students and what works specifically at WPI with their global program.

### 4.2.1: Culture and Perspective

A large part of the Global Experience at WPI is gaining cultural awareness and a “world-class” perspective from learning in a global setting (Worcester Polytechnic Institute, n.d.-a).

#### Figure 22

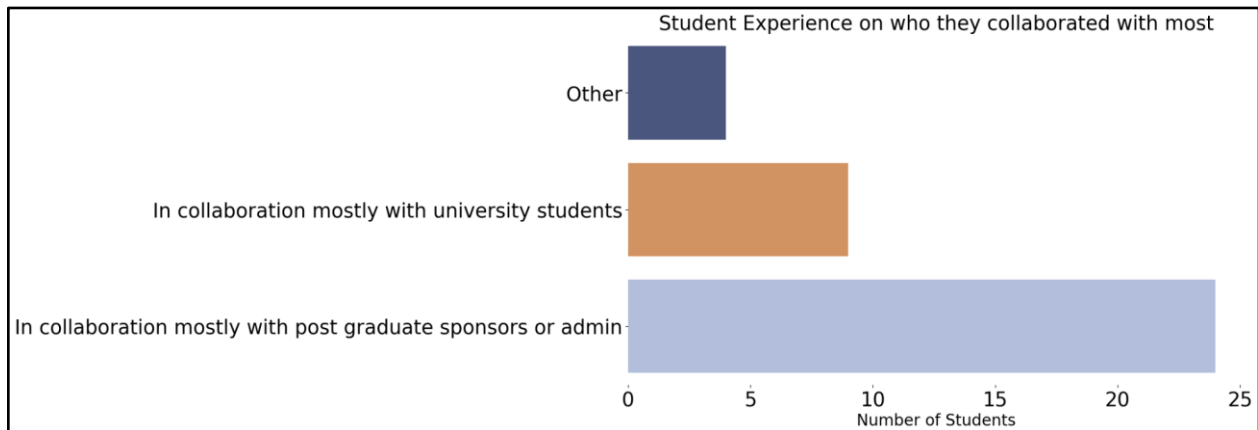
*Opinions on Cultural Awareness Improvements, Assimilation into Culture, and Usefulness of Project (Abroad Specifically)*



This shows us that students, through WPI global projects, are able to get more of an immersion and gain a deeper understanding of the new culture where their project is conducted. This can be further observed through the following datasets:

**Figure 23**

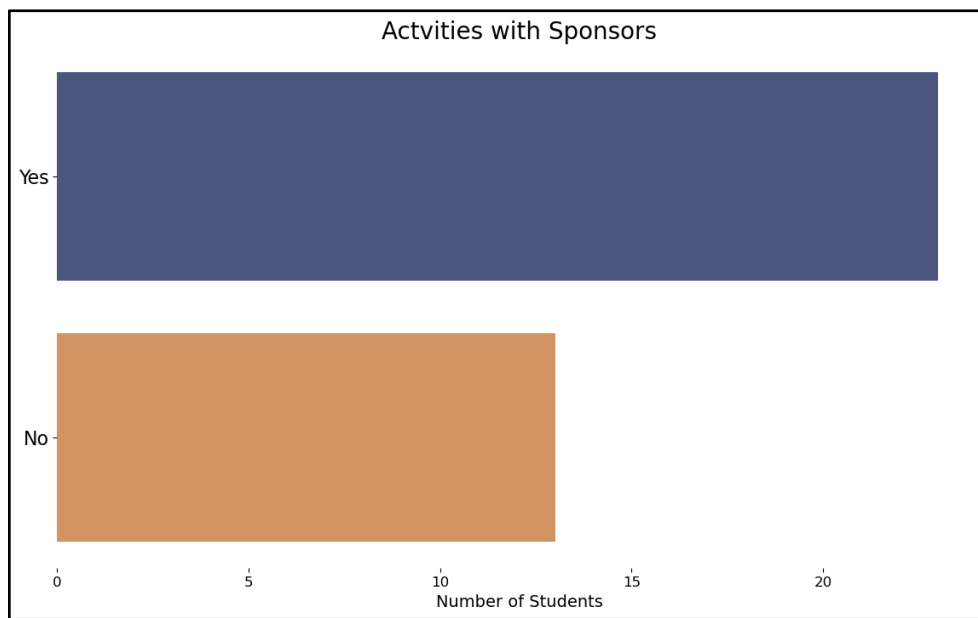
*Student Experience on Collaborating with Other Students or Sponsors/Administrators*



The majority of responses worked in collaboration with postgraduate sponsors as opposed to university students in cases where their sponsor worked with a university. Most students who selected “other” mentioned multiple sponsors or similar organizations to their sponsors.

**Figure 24**

*Student Experience in Interacting with Their Project Center or Sponsors*



The majority of students had opportunities working with or hosted by their sponsors for example surveying sidewalks or participating in international student events.

*“How did you spend your free time while away on IQP, HUA, or MQP?” (Free-Response)*

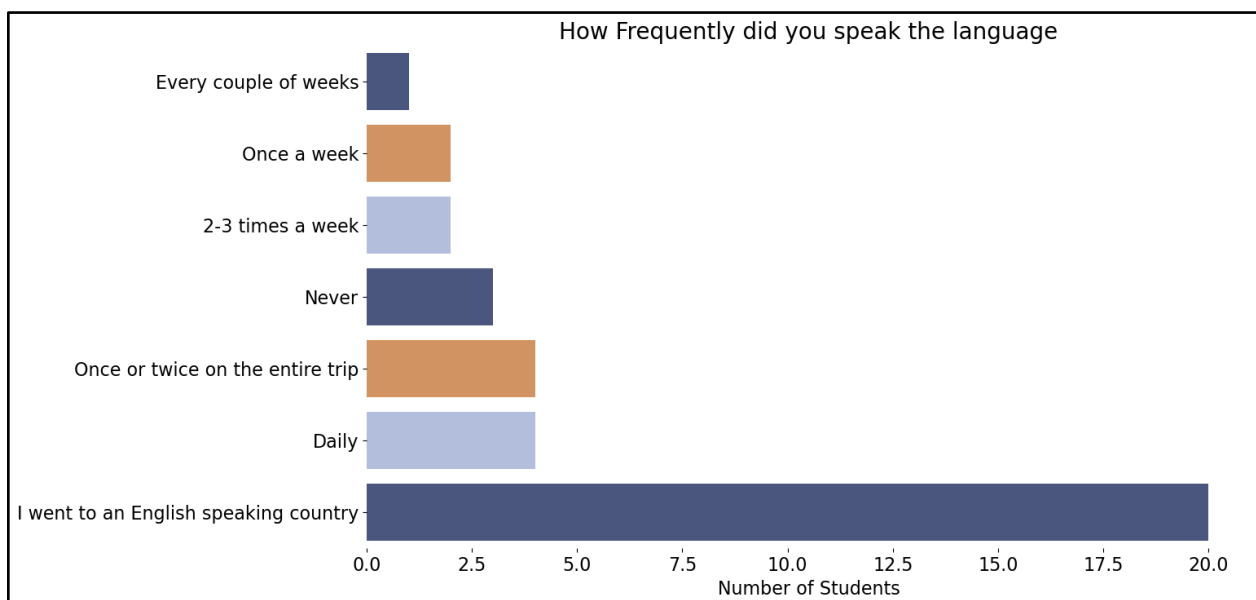
- Students reported traveling, exploring the city, sightseeing, and hanging out with other members of their cohort.

These specific datasets highlight the amount of students interacting with people in the community they are working with. The work done within IQP, HUA, and MQP projects often has a direct impact on the community they’re working with. Engaging, interacting, and collaborating with locals is one of the best ways to engage with a new culture. The more work done with and for the community, the more students learn (L. Polizzotto, personal communication, September 4, 2023).

Another aspect of cultural integration and experience is through language. We asked students:

### Figure 25

*How Often Students Spoke the Native Language (if applicable)*



Almost 60 % of responses were from students in English-speaking countries but the remaining spread was fairly even. 2 out of the 3 students who reported “never” went to countries with languages not taught at WPI: Italian and Icelandic.

Students were also asked: *“If you spoke the language, was it with people of the country, peers involved in your IQP, HUA, or MQP, sponsors, etc.?”*

- Out of the students who did speak the language at their location (21 responses), 62% reported that they most often conversed with people of the country, typically pleasantries in public areas or shops, with the second most popular at 24%, being sponsors.

These responses highlight some of the additional ways that students are able to further themselves within a community’s culture, showing even more opportunities and areas where students are able to grow and learn. The ability to converse with the community is invaluable and immensely important to immerse oneself in the culture (N. Burnham, personal communication, September 5, 2023).

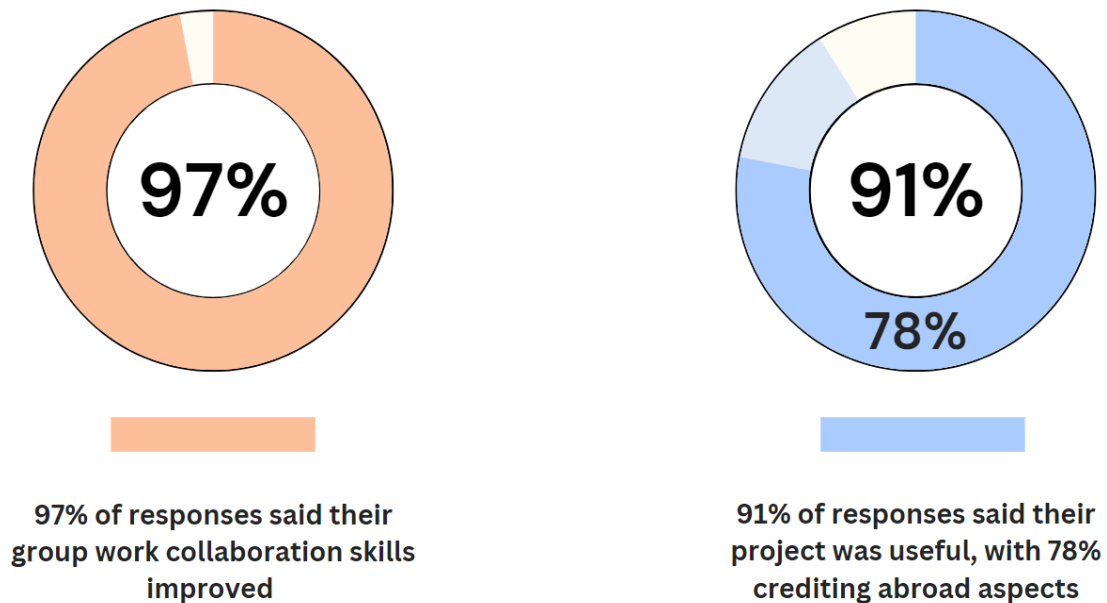
#### ***4.2.2: Post-Graduation Preparation***

Our main focus of this survey was to learn how WPI’s Global Experience draws students to WPI and prepares students for post-graduation life. 72% of the polled students stated their decision to attend WPI was influenced by the Global Projects Program, which enabled students to study abroad during their undergraduate career without disrupting their graduation timeline. This emphasizes how important it is to give students the opportunity to study abroad through their curriculum.

With the survey, we looked at the specific skills students gained through their experience abroad like teamwork skills, and the overall usefulness of their program, IQP, HUA, or MQP.

**Figure 26**

*Opinions on Collaboration Skills Improvement and Usefulness of Project (Abroad Specifically)*



Most students believe that going on IQP boosted their collaboration skills in new teams and environments. In addition, students generally had a positive project experience, stating that it immensely helped improve their public speaking and communication skills, elevate their ability to work in groups, better their technical writing, and help them gain independence due to being further away from home. Out of the 27 responses to the question, only 3 stated that it wasn't a useful experience. One said it was due to the specific project they were on, another said they "did not learn a lot of academic skills," and the third did not specify. For most students, their global experience was greatly beneficial and helped prepare them for their academic and professional careers.

### **4.3: Interview Findings**

In this section, we proceed to examine our interview findings, offering perspective on our comprehensive inquiry into Swiss culture and the development of bilateral exchange programs. Our discussions with key figures, including Professor Nancy Burnham and Mr. Dave Court, allowed us to gain valuable insights into Swiss

culture, its idiosyncrasies, and the role of a buddy system in a foreign exchange program. Furthermore, we detail our interactions with Ms. Magdalena Schreiber and the International Office at OST, uncovering crucial perspectives on the formation of bilateral exchange programs and the prerequisites for their success. Subsequently, we pivoted to our conversations with Ms. Kathleen Head and Ms. Krista Miller from WPI's Global Experiences Office, addressing credit transfer concerns and program specifics. Lastly, we touch on our interview with Dean John McNeill, providing an overview of the history and importance of the Global Experiences Office at WPI and their significance, further shaping our project's direction. These interviews, as previously stated, were conducted to help us further counsel OST and derive insights for enhancing their international exchange initiatives. Our rigorous examination of Swiss culture, along with the exploration of bilateral exchange programs, forms another foundation upon which we base our recommendations and proposed solutions.

#### ***4.3.1: Swiss Culture***

As U.S. students, we first noticed a vast difference in culture once we arrived in Switzerland. Fairly quickly, we noticed people around us in the grocery stores, trams, and museums, were much quieter than we were accustomed to being. There were several instances where we received looks from the locals, even if we were being quiet, striking us as a little unwelcoming. We decided to investigate any potential root causes or misconceptions about this with the intent of using that information to improve the process for future U.S. students going to Switzerland. This helped us create a guideline for a successful bilateral foreign exchange between WPI and OST.

The first person we interviewed about Swiss culture was Professor Nancy Burnham, a physics professor at WPI and the head of the Switzerland Project Center. She is originally from the U.S. and traveled initially to Europe when she was young, but has worked and studied in Germany, France, and Switzerland.

Professor Burnham first came to Europe in the '90s and was there for nine years, where she learned French and German almost fluently. We learned that it can take years to feel a general sense of belonging. While our IQP lasts 2 months and we will gain some similar insights, it will not be the same as living in the country for a few years. There's more time in a semester abroad in comparison to an IQP; that additional time is spent



in the country gaining one's bearings and making friends in the country, a concept that is easier when you know or start to learn the language. Learning the language is important not only for general comprehension but also for learning more about the culture. As for cultural differences, she noted that the Swiss dedicate time to having discussions and are generally more open-minded, in comparison to Americans, who often make assumptions. When it comes to politics, Switzerland is more relaxed and is not as dramatic as the U.S., where they often do not take the time to listen to other opinions or situations that are not their own.

The ideal program that Professor Burnham outlined during our conversation would include a buddy program for students to have someone to go to with questions, get more familiar and integrated with the culture, and a cultural orientation. There, students would learn about differences in culture and what to do when first arriving at the exchange location, along with answering questions students have on an administrative level when they first get to their exchange country.

### Figure 28

*Main Takeaways from Informant Interview:*

Mr. David Court
<ul style="list-style-type: none"> <li>• Insights into early experiences in Switzerland</li> <li>• Evolution of Swiss culture over the past three decades,</li> <li>• Comparison of Canadian and Swiss cultures</li> <li>• Observation on Swiss and Canadian perceptions of Americans</li> <li>• Personal integration into Swiss society</li> </ul>

### Figure 27

*Main Takeaways from Informant Interview:*

Professor Nancy Burnham
<ul style="list-style-type: none"> <li>• Personal transition to living in Europe</li> <li>• Cultural differences between the U.S. and Switzerland</li> <li>• The importance of learning the language of where you're living</li> <li>• What an ideal exchange program would include</li> <li>• Takes years to feel a general sense of belonging</li> </ul>

Our second interview featured Mr. Dave Court, the proprietor of Grain, a local American-style restaurant in Zurich. In 1991, at the age of 23, Mr. Court moved from Canada to Switzerland, initially for a summer job in Interlaken, leveraging his Swiss passport. Subsequently, he opted to continue his stay in Switzerland, working at an international boarding school.

During our conversation, Mr. Court shared insights into his early experiences in Switzerland, highlighting cultural

differences, such as Swiss cleanliness and social behaviors. He also discussed the evolution of Swiss culture over the past three decades, emphasizing increased diversification. Furthermore, Mr. Court compared Canadian and Swiss cultures, noting differences in views on immigration and cultural identity. Additionally, he shared observations about how Swiss people perceive Canadians and Americans. Despite initial language barriers, Mr. Court successfully integrated into Swiss society and embraced its work ethic and quality of life.

#### **4.3.2: Programs in OST and Europe**

The first interview we held to learn more about the programs at OST and in Europe was with Ms. Magdalena Schreiber, the head of the International Office for the School of Engineering, Computer Science, Architecture, Civil Engineering, Landscape Architecture, and Spatial Planning at OST. Our interview revealed that European universities, including OST, share similar semester timelines, credit systems, and lower tuition costs compared to the U.S. OST uniquely requires a year of practical experience prior to enrollment and is joining the European Project Semester, an advanced engineering program. Challenges for U.S. students include credit transfer issues, language barriers as OST's undergraduate courses are in German, and cultural and financial hurdles.

Furthermore, our project team had the privilege of participating in OST's orientation program for international students, providing us with valuable firsthand insights into the support mechanisms that prove beneficial for non-Swiss students. The orientation commenced with an ice-breaker activity designed to foster connections among attendees. Additionally, throughout the semester, various group activities were organized, including group hikes, visits to the Lindt Chocolate Factory and Museum in Zurich, excursions to the Christmas market in Zurich, and communal fondue dinners to

#### **Figure 29**

*Main Takeaways from Informant Interview:*

##### **Ms. Magdalena Schreiber**

- European semester timelines, credit systems, and tuition costs
- OST's focus on practical experience
- OST joining the European Project Semester
- OST international student orientation program and buddy system
- Challenges for U.S. students

mark the conclusion of the semester. These initiatives were instrumental in surrounding students with peers they could relate to. Despite not being OST students, our team felt more comfortable in Switzerland after the orientation day, even though we had already been in the country for a couple of weeks. Moreover, it covered essential administrative procedures and documentation required of foreign students in meticulous detail. The thorough walkthrough of the adjustment as an exchange student in Switzerland aimed to address student inquiries and boost their confidence in navigating the bureaucracy.

Notably, we observed OST's implementation of a buddy system for international students. Under this system, each international student is paired with an OST student who serves as a friendly contact and a point of reference for questions. This initiative contributes to international students' sense of inclusion and support from the beginning of their exchange experience.

#### **4.2.3: WPI's Current Exchange Programs**

Through several correspondences and meetings with Ms. Schreiber, our sponsor, we decided the ideal outcome from our IQP would be to form an outline for how to best implement a foreign exchange program with WPI.

#### **Figure 30**

*Main Takeaways from Informant Interview:*

##### **Ms. Kathleen Head and Ms. Krista Miller**

- WPI's current abroad programs
- WPI's struggle with maintaining a bilateral exchange program
- WPI's relationships with abroad universities
- WPI credit transfer logistics
  - Requires collaboration between host and home campuses
- Logistics of implementation at WPI

In order to find out more about the WPI aspect and feasibility of foreign exchange, we next talked to Ms. Kathleen Head and Ms. Krista Miller who are the Director and Assistant Director in the Global Experiences Office (GEO), respectively, at WPI.

WPI's current exchange program is small due to the low student demand, where there are only 10 outgoing and 30 incoming students (K. Head and K. Miller, personal communication, September 14,

2023). This is most likely because IQP is already established in the required curriculum, leaving limited time and space for students to go on an additional abroad program.

Another contributing factor to this is that GEO is not equipped to issue Visas, a common requirement, to outgoing students, making the application process more difficult.

WPI's current exchange programs include partnerships with the University of Technology, Business and Design Konstanz (HTWG) in Konstanz, Germany, KTH Royal Institute of Technology in Stockholm, Sweden, NEOMA Business School in Rouen, France and Tsinghua University in Beijing, China. At HTWB, outgoing sophomores will mostly earn credits for their Humanities and Arts (HUA) or German minor requirements, however, they have the opportunity to receive transfer credit for courses outside of those areas. WPI seniors may go to KTH to complete their MQP and take university classes at the same time for a semester.

Since WPI has limited programs available to students, most of the university partnerships they have are created through the Global Projects Program (GPP). For example, the university that works with the Copenhagen, Denmark IQP students are allowed to send 2 of their students to WPI each year in exchange for their university facilities. Similarly, the Zurich University of Applied Sciences (ZHAW) partners with WPI, where in exchange for sending over students, they sponsor a certain number of IQP projects for the Zurich Project Center.

### ***4.3.3: Credit Transfers***

Through our conversation with GEO at WPI, we determined that one of the biggest issues in WPI's exchange program is ensuring credit transfer when a student participates in a program so they can graduate on time. We have seen through the student surveys that this is also a concern to students.

During the interview with Ms. Kathleen Head and Ms. Krista Miller in the GEO, we were able to find out more about the credit transfer system in place at WPI. In this system, the credits transferred are determined once the student returns home from the exchange. This is similar to the transfer of community college credits where there is no prior agreement on accepted classes. In this case, if the course equivalent does not exist at WPI, the class will not count. Ms. Head and Ms. Miller have not experienced a situation in which failed credit transfers delayed graduation, however, since this is the only system in place, it is a potential occurrence. They highlighted the largest issue as

accessing partner schools' course catalogs prior to student departure, in order to determine which courses could transfer.

To learn more about course credits, we interviewed Dean John McNeill, the Dean of Engineering at WPI. We learned about the process of receiving transfer credits from other universities. He explained that one faculty member from WPI would meet with the potential partner university to compare their curriculums. Here, they would discuss how many credit hours each course is worth and how much overlap there is within the classes. This meeting would help determine which courses could be transferred and if a potential partnership would be mutually beneficial.

### Figure 31

*Main Takeaways from Informant Interview:*

#### Dean John McNeill

- Process of receiving transfer credits from other universities
- WPI and the potential partner university meet to compare curriculums
- Determine which courses could be transferred and if a potential partnership would be mutually beneficial.

## **Chapter 5: Recommendations**

The following chapter is an overview of our recommendations and implementation strategy culminated from our results chapter. It focuses on recommendations to increase the participation of WPI students by implementing a WPI-specific program at OST, in addition to potential implementations to incentivize U.S. students at other schools to participate at OST.

Our first two objectives were accomplished in the form of interviews and surveys among academic administrators experienced in exchange programs and U.S. STEM students. Our results informed us of common barriers for students participating in exchange programs, such as cultural isolation, language proficiency, lack of credit transfers, and financial burdens. When creating our recommendations for OST along with implementation strategy in order to increase student mobility, we focused on addressing each of these barriers in addition to others.

### **5.1 General Recommendations**

Our team highlighted the following barriers where changes need to be implemented to encourage more students to participate in OST exchange programs, as these issues were common across all STEM students in our surveys.

The areas we focused on were:

- 1) Cultural and Language Integration
- 2) Academic and Logistical Challenges
- 3) Financial Barriers

We recommend the following implementations for general universities to encourage more students:

It is imperative that there is a wider selection of undergraduate courses that are taught in English because students are less likely to choose to come to OST, even if they are interested in an exchange program. Instead, they will go somewhere else or not participate.

U.S. students should complete their exchange at OST in the spring semester, in order to best fit with the pre-existing and typical course schedule at American

universities, in which the Fall semester begins in August and ends in December, and the Spring semester begins in January and ends in May. To accommodate for the OST student schedule, it is recommended that OST students go to the U.S. for an exchange in the Fall semester, so they do not miss classes in the adjacent semester. Attending an exchange in the U.S. spring semester would interfere with OST's fall semester final exams, as they occur in January.

Financially, students will be paying their home institution's tuition, and in a typical bilateral exchange, the additional fees to participate at host institutions will be minimal to incentivize more students. However, since additional costs can include housing, dining, extracurriculars, and incidentals, it is recommended an agreement comes to reduced cost of housing for both parties involved.

### ***5.1.1 WPI Specific Recommendation to Institute a Bilateral Exchange***

For a bilateral exchange between OST and WPI, there would be an exchange of OST undergraduate students and WPI undergraduate students interested in completing both their IQP and major-related courses. For WPI students, this program would begin in C term (January to mid-March), as the beginning of the spring semester, with a project site location in Zurich, Switzerland. OST would need to sponsor a certain number of IQP projects to accommodate the number of students they wish to send to WPI and keep the bilateral exchange even. The IQP presentations and reports submissions would overlap with OST's first week of Spring semester classes, however, the majority of the IQP will be completed by then. In order to accommodate for this the C term IQP can start a week to 2 weeks earlier so that there is little to no overlap in the OST curriculum. Students who would stay to complete undergraduate courses would remain in OST student housing until their spring semester exams end in July. Students would have the typical foreign exchange student activities, schedule, and orientation.

Since the C Term IQP and D term exchange program are disconnected, applications for each would remain separated on WPI's side. A new location option for OST would be added to the WPI Exchange Program Application, in which students would fill in responses to questions and insert their resumes. WPI would use this information to decide which applicants to nominate to apply to the OST exchange program. In order to maximize participation, the exchange program would be rolling

admission. For example, if a student applies for IQP in Fall 2023 and is placed in Zurich for the C25 term, they would still be able to apply for the exchange program until its deadline in September 2024. The entire IQP cohort would be given information about the exchange program, in order to further encourage students to participate.

To ensure students begin OST class registration on time and connect with an advisor, students who submitted the exchange program application early will receive their nomination prior to the general project release date. After project site locations have been given, IQP students will start taking German lessons to learn basic German as a part of the Pre Qualifying Project (PQP), which will start in A Term and continue into B Term of their junior year. These two terms are unique to the WPI schedule and last 7 weeks each during the fall semester. Lessons will be graded on participation and effort during the lessons as a part of the final PQP grade that all students are given.

OST students would attend WPI during A and B terms since both OST's fall semester exams and spring semester overlap with WPI's C and D term calendar. Course registration will occur prior to departure in May to ensure adequate course selection. In late August, OST students will attend New Student Orientation (NSO), a program for all WPI first-year and transfer students that aims to help students acclimate to the university. Students will also have an assigned Community Advisor (CA), a person they can go to with any questions or concerns on the WPI community, in addition to events sponsored by the International House on American culture.

It is anticipated that, initially, there will be fewer WPI students going to OST than OST students going to WPI because students already have a global experience integrated into their curriculum and lack proficiency in the German language. In order to balance out the exchange, we recommend OST sponsor a certain number of IQPs and MQPs to accommodate the difference in students.

## **5.2: Addressing Academic and Logistical Challenges**

The common deterrents outlined by students are credit transfer issues, language barriers in classes, and insufficient support from the university. Our recommendations to remedy this issue are:

1. Establish a credit transfer system between universities
2. Expand English-taught courses



3. Provide support with Visa applications and all other administrative procedures

### ***5.2.1: Credit Transfer and Course Catalogs***

Developing a transparent and efficient credit transfer system is crucial for an exchange program between OST and U.S. universities. To accommodate this, a representative from both universities would meet to compare course catalogs. In this meeting, the U.S. university administrator would decide how many credit hours each OST course is worth, and vice versa. A complete list of transferable credits would be created and eventually shared with prospective students interested in this exchange program. This information would be added to WPI's Transfer Equivalents System (TES). Making this information easily accessible to these students is essential so they can determine if the program would fit their degree requirements and prevent setbacks in graduation. Both OST and WPI students would receive an advisor from the host university to work with to ensure credit transfer. With this advisor, they would form a contract listing each course to be taken, the program language, and course equivalent, including signatures from the universities' international offices and degree program heads. The WPI student will also need to fill out an undergraduate transfer credit authorization form prior to taking the course in addition to receiving department approval for the transfer (Worcester Polytechnic Institute, n.d.-d).

### ***5.2.2: Expanding English-Taught Courses***

As previously mentioned, U.S. university students want the classes they are taking to be taught in English. There is a limited selection of undergraduate classes at OST offered in English, making it difficult to include students from different STEM majors.

To accommodate the STEM students who are most interested in traveling abroad to OST, their major-specific classes should be offered in English. In our survey responses, these majors included Computer Science (CS) and Mechanical Engineering (ME). With the current curriculum for ME at OST, there would need to be improvements if those students are desired. When converting courses to English, there should be a focus on those that overlap between majors to provide greater accessibility

to more students and reduce administrative changes. As an alternative, the exchange program would need to be specifically marketed only to Computer Science, Electrical Engineering (EE), Systems Engineering (SE), Industrial Engineering (IE), and Renewable Energy and Environmental Engineering (EEU) majors, as these are the only areas where there are enough classes offered in English to be beneficial toward a degree.

### ***5.2.3: Administrative and Daily Life Assistance***

Providing support and resources for incoming students (both at OST and WPI) in all administrative procedures is important in preparing and supporting them to participate in the semester-long exchange program. Host universities need to offer visa and incoming student support in order to help students acclimate to aspects of daily life, as this information is not easily available in different countries. This includes but is not limited to, providing information on applications for visas, highlighting relevant necessary documents, preparing for interviews, and navigating public transportation.

## **5.3: Financials**

Addressing the financial aspect of exchange programs is crucial for success, especially in the case of OST and WPI. The cost associated with studying abroad is a significant barrier for students. Balancing affordability while ensuring a quality experience is paramount for exchange programs to be sustained over long periods of time. Our recommendations for this issue are:

1. Balancing the exchange of tuition and housing costs
2. Supporting additional everyday expenses

### ***5.3.1: Tuition and Housing***

To lower individual costs per student, we recommend that both OST and WPI provide housing for respective incoming international students. Both OST and WPI would need to set aside apartment-style dorms for up to 5 students each semester, with the potential for increase as demand increases. To accommodate the possible issue of OST students participating at WPI more than WPI students participating at OST. If feasible, OST would also provide discounted housing for the WPI Zurich IQP at their Rapperswil-Jona location, but general facilities will be available too, such as workspace

for students in the form of conference rooms. As that campus is a 40-minute train ride from Zurich Old Town, and still centrally located on Lake Zurich, this would keep all students in one location for the duration of both IQP and their exchange program. In addition, OST would sponsor a number of IQP projects to cover the difference.

### **5.3.2: Outside Fees**

Outside of tuition and housing, students have to pay daily costs of living, which would include transportation, food, incidentals, and extracurriculars. To alleviate this, we recommend that WPI extend the Global Scholarship to WPI students involved in the exchange program. In addition, the Swiss-European Mobility Programme (SEMP) scholarship can be potentially allocated to WPI students; this program provides funding for students going on exchange programs (Movetia, n.d.). Additional scholarship money, ranging from \$1,000-2,500, should be given to those students to accommodate the longer program duration. This approximation was given through discussion with the GEO department and the potential stipend offered by SEMP. Since the cost of living in Switzerland is much greater than the cost of living in the U.S., this is important to further incentivize students.

## **5.4: Enhancing Cultural Integration**

To accommodate the fear of adapting to a new country with different customs and languages while being away from a stable support system, we made the following recommendations:

1. Language preparation and support prior to departing at the origin university
2. Buddy System implemented by host university students
3. Cultural Orientation Programs

### **5.4.1: Language Preparation and Support**

Becoming proficient in the local language is crucial for integrating exchange students in foreign areas, aiding in both daily communication and insight into the host country's culture.

Schools participating in exchange programs should incorporate language preparation, like an additional language class prior to departure. As a specific example, WPI can incorporate it into the Pre-Qualifying Project (PQP) course, which is taken prior to departure on IQP. This provides students with foundational language skills and cultural understanding, allowing for everyday conversations before their exchange. Schools should offer language support through their international office or house, ensuring students have access to the proper resources that are essential for full engagement in their academic and social lives.

Fostering an exchange program that prioritizes learning the language of the country or area allows for more beneficial interactions between international students and the local population. This can be further enhanced through initiatives such as conversation partners, language exchange programs, and multicultural events, which can be hosted and operated by either the host university or the home university of the student. By implementing these strategies and fostering an inclusive environment, OST, WPI, and other universities can ensure a mutually enriching and culturally immersive exchange experience for both international and local students.

#### ***5.4.2: Buddy System***

Students highlighted a hesitation to travel abroad due to fear of leaving friends and family. This hesitation can be accommodated through group exchange programs, and a support system similar to the OST buddy system. This implementation would lower the difficulty of cultural assimilation.

The Buddy System at OST is a support mechanism in which each international student is paired with a local student who is able to be a friend and guide during their stay. This system is particularly effective in helping them navigate a new academic environment and foster a sense of community. Implementing this program at all universities participating in exchange programs will help students acclimate to a new culture and environment more quickly.

**Figure 32***OST International Student Program*

*Note.* This image shows exchange program students, their buddies, and our IQP group attending the OST International Student Program. Image used with permission by (M. Schreiber, personal communication, September 14, 2023).

We recommend establishing a new Buddy Program, which provides incoming exchange students with a reliable point of contact and support, in addition to building strong connections and enhancing the exchange experience. Training and resources should be provided to the buddies based on current bilateral programs or the nature of their buddies' exchange. This will equip them with the necessary skills and knowledge to better support the international student body whilst also addressing the unique needs and challenges of their own buddy. As noted by Professor Burnham, such training can cover cultural sensitivity, communication skills, and knowledge of available resources and services, ensuring that buddies are well-prepared to assist in any situation.

Organizing regular meetings, group activities, and events can encourage interaction, facilitate cultural exchange, and help international students feel more integrated and supported during their time at WPI or other institutions. By continuously investing in the establishment and enrichment of the Buddy System, both OST and WPI can create a more inclusive and supportive environment for international students.

#### ***5.4.3: Cultural Orientation Programs***

At OST, cultural orientation programs play a pivotal role in acclimating international students to a new environment and helping them navigate the cultural nuances of Switzerland. In general, the programs begin with ice-breaker activities, fostering connections among exchange program students, and facilitating the formation of support networks. Additionally, a variety of group activities are organized throughout the semester, including excursions and communal dinners, which serve to enhance the sense of community among international students and help them feel more at ease in a foreign setting.

Applying such a model to WPI, prior to and upon arrival for incoming and outgoing students, can significantly aid in addressing cultural differences and misconceptions. A structured cultural orientation program at WPI could include workshops on American & foreign customs, traditions, and social norms, alongside interactive sessions aimed at debunking common misconceptions and stereotypes about other countries exchange students may go to. By addressing the challenges of cultural adaptation proactively, WPI can ensure a smoother transition for international students and their own students going on exchanges and contribute to their overall academic and social successes on campus and abroad.

#### **5.5: Implementation Strategy**

To accomplish these recommendations, we set out to outline an ideal plan of action. The OST international office should have initial contact and discussions with Professor Nancy Burnham and Ms. Kathleen Head, after which they should be introduced to the appropriate WPI administrators for further implementation and plans.

1. Discuss with Professor Nancy Burnham about creating more IQP and MQP project opportunities to sponsor, with a potential emphasis on projects involving OST students.
  - i. For example, here's a potential MQP: [Industrial Engineering Project](#)
2. Meet with the Registrar/Transfer Admissions Team to determine bilateral transferable credits.
  - i. Add OST courses to the [course transfer database](#)
  - ii. Emails of office dealing with credit transfer: [transfer@wpi.edu](mailto:transfer@wpi.edu), and [registrar@wpi.edu](mailto:registrar@wpi.edu)
3. Discuss with WPI department heads to get approval on transfer classes.
  - i. Add accepted WPI/OST course transfers onto the exchange program information site (E-projects). For example, CSxxxx translates to OST's CSxxxx for clarity and ease.
  - ii. As of now, the only majors who can participate in major-specific classes (taught in English) at OST are Electrical Engineering, Computer Science, Renewable Energy and Environmental Engineering, Industrial Engineering, Systems Engineering (Term Project), Mechanical Engineering (only one class), and Language Classes (many opportunities).
4. Request course syllabi from WPI to share with OST department heads.
5. Discuss with Professor Nancy Burnham about making OST the housing for all Zurich exchange students.
6. Discuss with Professor Nancy Burnham about making OST facilities available for WPI IQP students.
7. Discuss with WPI residential services about getting spots set aside for OST international students during A/B term, written into the exchange agreement.
8. Coordinate with the international house on visa information prior to arrival if appointments and documents are necessary.
9. Discuss with Ms. Kathleen Head about extending the WPI Global Scholarship to exchange students.

10. Discuss with Professor Nancy Burnham about allocating the SEMP scholarship to WPI students.
11. Find more partnerships outside of WPI for a wider reach. We suggest reaching out to universities based on student responses from our survey.



## **Chapter 6: Conclusion**

### **6.1: Limitations and alternatives**

Some limitations we have encountered with our recommendations and results are the potential for group-response bias and the limited time we have during the 14 weeks we worked on this program.

Since we are a group of students from WPI, we received a higher response rate from WPI students due to our resources and connections to our institution. To mitigate this, we kept the survey open for an extended period and employed various channels for promotion to other schools and personal connections to other engineering departments at other schools. Despite the variety of distribution methods, we were limited in the variety of our responses and this limited how widespread we could make recommendations. Leading us to focus our recommendation on WPI and OST. Our limited time did not allow us to fully implement and reach out to the WPI administration on the implementation of our exchange program. Additionally, the amount of time that we had was a restriction on the amount of data that we were able to collect. With more time, we would have ideally been able to get more universities to participate, getting more students, and overall a wider range of responses to better represent the STEM student population in the U.S.

In the same aspect, additional time would've allowed for the exploration of alternatives such as other partner universities for OST to collaborate with, more scholarship opportunities, and different program organizations. Alternatives to our class exchange program would be implementing major-specific international programs similar to WPI's MQP program. This implementation would at a minimum require reaching out to department heads at both institutions and multiple willing professors to accommodate an array of majors, in addition to exploring potential logistical issues. However, this alternative ranked highly in our surveys of U.S. STEM students.

### **6.2: Short-term and long-term implications**

Immediately following our project, those most impacted will be the communities at OST and U.S. STEM universities, specifically WPI. If our recommendations are followed, there will be small changes at both WPI and OST, such as WPI allocating

housing opportunities for exchange students from OST, and OST offering more course options taught in English. When there are new students at the school, the culture has a bit of an opportunity to shift as well, due to new influences. With the success of an initial program, a deeper partnership will be able to form.

Ultimately, in the long term, there will be an additional global experience that is offered to WPI and OST students to further their learning opportunities. Additionally, there will be new connections that OST is able to form with additional schools, and new global opportunities for their students will arise from doing so.

Despite our data having an intended use for OST administrators, it can easily be used by other universities as well. The data collected from STEM universities across the U.S. will be extremely useful to universities looking to expand their opportunities for going abroad for school. In a post-pandemic world, where most studies regarding studying abroad or foreign exchange were done prior to the introduction of COVID-19, any data collecting student sentiments after such a globally impactful event is invaluable. Our data will be able to be used from universities all over the country at schools that offer STEM majors, and responses can be used to build upon existing structures or even form new programs at these universities, in order to widen opportunities for their students. Specifically at WPI, it will allow administrators to have more current data on their global projects and how students view the impact that it has had on them in their personal and professional lives.

Those who benefit from the work we have done are those within the communities at OST and U.S. universities, and more broadly, the U.S. and Switzerland as a whole. The students attending OST and U.S. universities, specifically WPI, will be able to participate in additional opportunities for studying abroad, and because there is a framework that we have put into place, there will be more opportunities that will arise. Additionally, other universities will be able to utilize the research we have done and use it in their programs and structures. This helps both the U.S. and Switzerland since it boosts views of one another between countries and helps further innovation between cultures.

Even though our research was able to reach over 300 students at 20 universities, there is always more that could be built upon. If more universities were involved, data would be more expansive and applicable to additional universities, both in the U.S. and

Switzerland. More research could also be done with a focus on a specific U.S. STEM university, especially since there are a fair amount of STEM universities that have pre-existing programs in place. It could be used further by additional U.S. universities to compare what they have in place and to see what they would be able to do to improve upon the current structures that they have in place.

The most impactful thing that can be done though is the actual implementation of the recommendations that our team has formed. This will open up further opportunities, through the networks of both schools, and it will have a direct impact on the students involved, along with the communities within both schools.

### **6.3: Sustainable Development Goals**

Goal 4 of the seventeen Sustainable Development Goals, as outlined by the United Nations, is to “ensure inclusive and equitable quality education and promote lifelong learning opportunities for all” (United Nations, 2023, section. Goal 4). Much of the appeal of foreign exchange programs is the continuation of lifelong learning, getting to learn in a different environment than what could be considered “normal,” and learning from social and cultural aspects by living in a different area, regardless of the duration of time. This directly correlates to the “pomot[tion of] lifelong learning opportunities for all,” because foreign exchange is not directly necessary for a STEM degree, but it allows for a more global perspective and additional learning outside of what the typical degree is and encourages that learning further.

OST in Zurich, Switzerland recognizes the importance of Goal 4 for not only their university students but also for the students from the U.S. they are hoping to attract. Our sponsor’s goal in working with the U.S. in the scope of our IQP was to increase the internationalization between the U.S. and Switzerland through understanding what attracts U.S. students to foreign exchange programs, which directly correlated with this.

## References

- AAP Finance News Wire. (2013, August 13). FED: The annual cost of studying abroad. *ProQuest*.  
<https://www.proquest.com/docview/1421976105/abstract/CC346B4491684B5D>  
 PQ/1
- AIEA. (2019). *Home*. Aieaworld.org. <https://www.aieaworld.org/>
- Atalar, A. (2019). Student exchange: The first step toward international collaboration. In *Successful Global Collaborations in Higher Education Institutions* (pp. 63–71). Springer, Cham. [https://doi.org/10.1007/978-3-030-25525-1\\_7](https://doi.org/10.1007/978-3-030-25525-1_7)
- Bartell, M. (2003). Internationalisation of universities: A university culture-based framework. *Higher Education*, 45(1), 43–70.  
<https://doi.org/10.1023/a:1021225514599>
- Bell, A. D., Hodges, L. E., Rubin, D. L., & Shiflet, C. (2022). Need-Based aid, participation in education abroad, and program type choice. *Journal of Student Financial Aid*, 51(3). <https://doi.org/10.55504/0884-9153.1797>
- Berg, M. V., Connor-Linton, J., & Paige, R. M. (2009). The Georgetown consortium project: Interventions for student learning abroad. *Frontiers: The Interdisciplinary Journal of Study Abroad*, 18(1), 1–75.  
<https://doi.org/10.36366/frontiers.v18i1.251>
- Bhattacharjee, A. (2012). *Social science research : principles, methods, and practices* (2nd ed.). Textbooks Collection.  
[https://digitalcommons.usf.edu/cgi/viewcontent.cgi?article=1002&context=oa\\_textbooks](https://digitalcommons.usf.edu/cgi/viewcontent.cgi?article=1002&context=oa_textbooks)
- Bird, S., Klein, E., & Loper, E. (2009). *Natural language processing with Python*. O'Reilly Media Inc.
- Black, H. T., & Duhon, D. L. (2006). Assessing the impact of business study abroad programs on cultural awareness and personal development. *Journal of Education for Business*, 81(3), 140–144. <https://doi.org/10.3200/joeb.81.3.140-144>
- Bouchrika, I. (2022, June 7). *Engineering degree guide: 2022 costs, requirements & job opportunities*. Research.com. <https://research.com/degrees/engineering-degree>

- Bound, J., Braga, B., Khanna, G., & Turner, S. (2021). The globalization of postsecondary education: The role of international students in the US higher education system. *Journal of Economic Perspectives*, 35(1), 163–184.  
<https://doi.org/10.1257/jep.35.1.163>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.  
<http://dx.doi.org/10.1191/1478088706qp0630a>
- Braunschweig, T. U. (n.d.). *Rhode Island – USA*. [www.tu-braunschweig.de](http://www.tu-braunschweig.de). Retrieved April 9, 2023, from <https://www.tu-braunschweig.de/en/fmb/international/double-degree-programmes/rhode-island-usa>
- CIEE. (n.d.). *Study abroad*. CIEE. <https://www.ciee.org/go-abroad/college-study-abroad>
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). Sage Publications Ltd.
- Cummings, J. N., & Kiesler, S. (2008). Who collaborates successfully? *Conference on Computer Supported Cooperative Work*, 437–446.  
<https://doi.org/10.1145/1460563.1460633>
- Deardorff, D. K. (2006). Identification and assessment of intercultural competence as a student outcome of internationalization. *Journal of Studies in International Education*, 10(3), 241–266.
- Doyle, S., Gendall, P., Meyer, L. H., Hoek, J., Tait, C., McKenzie, L., & Looiparg, A. (2009). An investigation of factors associated with student participation in study abroad. *Journal of Studies in International Education*, 14(5), 471–490.  
<https://doi.org/10.1177/1028315309336032>
- Engle, L., & Engle, J. (2004). Assessing language acquisition and intercultural sensitivity development in relation to study abroad program design. *Frontiers: The Interdisciplinary Journal of Study Abroad*, 10(1), 219–236.  
<https://doi.org/10.36366/frontiers.v10i1.142>
- EPS. (n.d.). *Concept | European Project Semester*. [europeanprojectsemester.eu](http://europeanprojectsemester.eu). Retrieved September 20, 2023, from <http://europeanprojectsemester.eu/concept>
- Erasmus+. (n.d.). *What is Erasmus+?* [Erasmus-Plus.ec.europa.eu](http://erasmus-plus.ec.europa.eu). Retrieved April 25,

- 2023, from <https://erasmus-plus.ec.europa.eu/node/2515>
- European Commission. (2021, March 29). *10 things you didn't know about erasmus!* Medium. <https://europeancommission.medium.com/10-things-you-didnt-know-about-erasmus-41bb2c8ebd9c>
- Farrugia, C., & Sanger, J. (2017, October). *Gaining an employment edge - the impact of study abroad*. IIE - the Power of International Education. <https://www.iie.org/publications/gaining-an-employment-edge-the-impact-of-study-abroad/>
- Frisch, S., Parsons, C., Weisse, E., & Matticoli, E. (2022, October 13). *Increasing international activity among engineering students*. Worcester Polytechnic Institute.
- Global Education Oregon. (n.d.). *What is an exchange program?* Geo.uoregon.edu. Retrieved April 10, 2023, from <https://geo.uoregon.edu/exchange-programs>
- Grandin, J. M., & Berka, S. (2014). The university of Rhode Island international engineering program: A model for the merger of technology and the humanities. *Russian Language Journal / Русский язык*, 64, 25–51. <http://www.jstor.org/stable/43669249>
- Heldstab, A., Vetsch, B., Kuster, R., Segmuller, J., Kyburz, F., Nigsch, S., Inamdar, H., Swiriska, Z., Salts, N., & Graber, T. (2012). *Semester abroad (student exchange)*. OST. <https://www.ost.ch/en/research-and-consulting-services/technology/system-technology/ies-institute-for-energy-systems/further-education/semester-abroad-student-exchange>
- Homburg, C., Klarmann, M., Reimann, M., & Schilke, O. (2012). What drives key informant accuracy? *Journal of Marketing Research*, 49(4), 594–608. <https://doi.org/10.1509/jmr.09.0174>
- IIE. (n.d.). *Find a Scholarship or Program*. IIE - the Power of International Education. <https://www.iie.org/scholarships-programs/>
- IIE Open Doors. (2022). *IIE Open Doors / host regions*. IIE Open Doors / Host Regions. <https://opendoorsdata.org/data/us-study-abroad/host-regions/>
- International Engineering Alliance. (n.d.). *Washington accord*. [Www.ieagreements.org](http://www.ieagreements.org). <https://www.ieagreements.org/accords/washington/>
- Jibeen, T., & Khan, M. A. (2015). Internationalization of higher education: Potential

- benefits and costs. *International Journal of Evaluation and Research in Education (IJERE)*, 4(4), 196. <https://doi.org/10.11591/ijere.v4i4.4511>
- Johnson, M. M. (2017, February 17). *White House Focuses on Study Abroad and Global Citizenship at Travel Bloggers Summit | NAFSA*. [Www.nafsa.org](http://www.nafsa.org).  
<https://www.nafsa.org/blog/white-house-focuses-study-abroad-and-global-citizenship-travel-bloggers-summit>
- Knight, J. (2004). Internationalization remodeled: Definition, approaches, and rationales. *Journal of Studies in International Education*, 8(1).  
<https://doi.org/10.1177/1028315303260832>
- Leask, B. (2009). Using formal and informal curricula to improve interactions between home and international students. *Journal of Studies in International Education*, 13(2), 205–221. <https://doi.org/10.1177/1028315308329786>
- Leask, B., & Carroll, J. (2011). Moving beyond “wishing and hoping”: Internationalisation and student experiences of inclusion and engagement. *Higher Education Research & Development*, 30(5), 647–659.  
<https://doi.org/10.1080/07294360.2011.598454>
- Lee, M. (2012, April 17). *The complete history of study abroad*. Go Overseas.  
<https://www.gooverseas.com/blog/history-study-abroad>
- Leung, K., Ang, S., & Tan, M. L. (2014). Intercultural competence. *Annual Review of Organizational Psychology and Organizational Behavior*, 1(1), 489–519.  
<https://doi.org/10.1146/annurev-orgpsych-031413-091229>
- Lohmann, J. R., Rollins, H. A., & Joseph Hoey, J. (2006). Defining, developing and assessing global competence in engineers. *European Journal of Engineering Education*, 31(1), 119–131. <https://doi.org/10.1080/03043790500429906>
- McBrien, J., Dooley, K., & Birman, D. (2017). Cultural and academic adjustment of refugee youth: Introduction to the special issue. *International Journal of Intercultural Relations*, 60, 104–108.  
<https://doi.org/10.1016/j.ijintrel.2017.07.001>
- Movetia. (n.d.). *Mobility for Higher Education: Swiss-European Mobility Programme (SEMP)*. [Www.movetia.ch](http://www.movetia.ch). Retrieved October 3, 2023, from  
<https://www.movetia.ch/en/programmes/international/swiss-programme-for-erasmus/higher-education/mobility>

- NAFSA. (2019). *Trends in U.S. study abroad*. NAFSA. <https://www.nafsa.org/policy-and-advocacy/policy-resources/trends-us-study-abroad>
- NCA. (2016, April 26). *Internationalization*. National Communication Association. <https://www.natcom.org/academic-professional-resources/internationalization#:~:text=Internationalization%20links%20communities%20to%20the>
- Needy, K. L., Pohl, E. A., & Specking, E. (2012, June 10). *Raising the level of participation in study abroad by industrial engineering undergraduate students*. Peer.asee.org. <https://peer.asee.org/raising-the-level-of-participation-in-study-abroad-by-industrial-engineering-undergraduate-students>
- Northeastern University. (n.d.-a). *Co-op participation - career outcomes at northeastern university*. Careeroutcomes.northeastern.edu. <https://careeroutcomes.northeastern.edu/coop-participation/>
- Northeastern University. (n.d.-b). *Cooperative education*. Employer Engagement and Career Design. <https://careers.northeastern.edu/cooperative-education/>
- Nunan, D. (2001). English as a global language. *TESOL Quarterly*, 35(4), 605. <https://doi.org/10.2307/3588436>
- OST. (n.d.-a). *International relations*. OST. Retrieved May 3, 2023, from <https://www.ost.ch/en/international-relations-ost>
- OST. (n.d.-b). *Tuition and fees*. OST. [https://www.ost.ch/en/education/management/bachelor-management-und-recht/fees-and-registration#:~:text=Tuition%20fees&text=Semester%20fee%20\(per%20semester\)%3A,%2D%20%5B2%5D](https://www.ost.ch/en/education/management/bachelor-management-und-recht/fees-and-registration#:~:text=Tuition%20fees&text=Semester%20fee%20(per%20semester)%3A,%2D%20%5B2%5D)
- Paris, E. (2023, March 9). *The power of diversity in engineering: How different perspectives drive innovation*. ESILV Graduate School of Engineering, Paris. <https://www.esilv.fr/en/the-power-of-diversity-in-engineering-how-different-perspectives-drive-innovation/>
- Petzold, K., & Moog, P. (2017). What shapes the intention to study abroad? An experimental approach. *Higher Education*, 75(1), 35–54. <https://doi.org/10.1007/s10734-017-0119-z>
- Queen's University. (n.d.). *Bilateral Exchange Program | International Programs*



- Office. Queensu.ca. Retrieved September 11, 2023, from <https://www.queensu.ca/ipo/outgoing-exchange/programs/bilateral>
- Rami, Ar. P. (2021). *ERASMUS+ Programme, the internationalization of higher education*. InterNepInd. <https://internepind-eplus.eu/erasmus-plus-programme-internationalization-hei/#:~:text=The%20motivations%20for%20internationalization%20include>
- Raubenheimer, C. D., & Young, R. E. (2008). Brazilian engineering exchange program. *2008 38th Annual Frontiers in Education Conference, S4E-1-S4E-6*. <https://doi.org/10.1109/fie.2008.4720301>
- Saldaña , J. (2016). *The coding manual for qualitative researchers* (3rd ed.). SAGE.
- Snow, N. (2008). International exchanges and the U.S. image. *The ANNALS of the American Academy of Political and Social Science*, 616(1), 198–222. <https://doi.org/10.1177/0002716207311864>
- Statista. (2022). *Top fields of study for U.S. students studying abroad 2020-2021*. Statista; Statista. <https://www.statista.com/statistics/237722/most-popular-fields-of-study-for-us-students-studying-abroad/>
- Stein-Smith, K. (2023, July 20). *Foreign language classes becoming more scarce*. American Academy of Arts & Sciences. <https://www.amacad.org/news/foreign-language-classes-becoming-more-scarce>
- Study Metro. (2023, May 18). *The Economics of Studying Abroad: Understanding the Return on Investment*. Wwww.linkedin.com. <https://www.linkedin.com/pulse/economics-studying-abroad-understanding-return-investment/>
- Syracuse University. (n.d.). *Programs - abroad – Syracuse University*. Suabroad.syr.edu. Retrieved September 7, 2023, from <https://suabroad.syr.edu/destinations/>
- Tashakkori, A., & Creswell, J. W. (2007). The new era of mixed methods. *Journal of Mixed Methods Research*, 1(1), 3–7. <https://doi.org/10.1177/2345678906293042>
- Teichler, U. (2017). Internationalisation trends in higher education and the changing role of international student mobility. *Journal of International Mobility*, 5(1), 177. <https://doi.org/10.3917/jim.005.0179>

- Twombly, S. B., Salisbury, M. H., Tumanut, S. D., & Klute, P. (2012). *Study abroad in a new global century*. John Wiley & Sons.
- U.S. Department of State. (n.d.). *USA StudyAbroad*. USA StudyAbroad. Retrieved April 11, 2023, from <https://studyabroad.state.gov/>
- U.S. Department of State. (2022, April 13). *Fulbright Program Commemorates 75th Anniversary - United States Department of State*. United States Department of State. <https://www.state.gov/dipnote-u-s-department-of-state-official-blog/fulbright-program-commemorates-75th-anniversary/>
- United Nations. (2023). *The 17 sustainable development goals*. United Nations. <https://sdgs.un.org/goals>
- University of California Los Angeles. (2022). *2022 CIRP freshman survey*. University of California Los Angeles. <https://heri.ucla.edu/wp-content/uploads/2023/05/DATA-TABLES-TFS-2022.pdf>
- University of Delaware. (n.d.). *Our study abroad history*. University of Delaware. Retrieved April 10, 2023, from <https://www.udel.edu/academics/global/study-abroad/history/>
- University of Nevada. (n.d.). *Gender discrepancies in STEM*. University of Nevada, Reno. Retrieved September 13, 2023, from <https://www.unr.edu/nevada-today/blogs/2022/gender-discrepancies-in-stem>
- University of Rhode Island. (n.d.). *International engineering program*. University of Rhode Island. Retrieved September 13, 2023, from <https://web.uri.edu/engineering/academics/iep/about-the-iep/>
- University of Rhode Island. (2023). *The University of Rhode Island international engineering program facts and figures 2022-2023*. Google Docs. <https://drive.google.com/file/d/1-42S3-H3BViB8JJX6dNzTWNy22YdktEA/view>
- Widiger, T. A., & Oltmanns, J. R. (2017). Neuroticism is a fundamental domain of personality with enormous public health implications. *World Psychiatry, 16*(2), 144–145. <https://doi.org/10.1002/wps.20411>
- Worcester Polytechnic Institute. (n.d.-a). *Global projects program*. WPI. <https://www.wpi.edu/project-based-learning/project-based-education/global-project-program>

- Worcester Polytechnic Institute. (n.d.-b). *Global scholarship*. Wwww.wpi.edu. Retrieved September 20, 2023, from <https://www.wpi.edu/admissions/tuition-aid/types-of-aid/scholarships-grants/global>
- Worcester Polytechnic Institute. (n.d.-c). *Interactive qualifying project*. Wwww.wpi.edu. Retrieved September 20, 2023, from <https://www.wpi.edu/project-based-learning/project-based-education/interactive-qualifying-project>
- Worcester Polytechnic Institute. (n.d.-d). *TES public view: Worcester Polytechnic Institute*. Tes.collegesource.com. Retrieved September 28, 2023, from [https://tes.collegesource.com/publicview/TES\\_publicview01.aspx?rid=34076cbf-fca1-4968-8f3f-08d4e25fd9d5&aid=04996a1f-7563-4932-a580-3b9fb14fa403](https://tes.collegesource.com/publicview/TES_publicview01.aspx?rid=34076cbf-fca1-4968-8f3f-08d4e25fd9d5&aid=04996a1f-7563-4932-a580-3b9fb14fa403)
- Worcester Polytechnic Institute. (2021). *Tuition & fees 2020-2021*. WPI. <https://www.wpi.edu/offices/bursar/tuition>

## Appendix

### **Appendix A<sup>1</sup>: Survey for U.S. STEM Students about Foreign Exchange Programs (Interest/Non-Interest and Experiences)**

Survey questions for U.S. students who have/have not gone abroad for exchange programs:

1. What university do/did you attend?
2. What is your field of study?
3. What year are you in?
4. Are you a full time or part time student?
5. What is your gender identity?
6. What would be your preferred exchange program format?
7. Would you participate in an exchange program in Switzerland? Why or why not?
8. What language would you prefer to participate in an exchange program in?
9. Have you studied abroad or participated in exchange programs? (Y or N)

If yes:

10. Where did you go abroad?
11. What type of exchange program did you participate in?  
If “Through YOUR university” or “Through an organization” is selected:
  12. What university, if any, did your organization or “home” university connect you with for your exchange program?
13. What was the purpose of your exchange program experience? Add clarification if necessary.
14. How do you feel your home or abroad institution could have improved the process?
15. On a scale from 1-10, how difficult do you feel it was to complete the process of enrolling in an exchange program? 1 is no difficulty, and 10 is extreme difficulty
16. Did you find (your university) website for exchange programs to be navigable? 1 is no difficulty, and 10 is extreme difficulty

---

<sup>1</sup> The appendices (A and B) are derived from what was used in the previous Switzerland Exchange IQP in October 2022. This is to have results from U.S. students that are directly comparable to the results received from the Swiss students who answered the same questions (Frisch et al., 2022, pg 55). In addition, more survey questions will be added once our initial literature reviews are completed so the questions become more specific to exchange programs.

17. What qualms did you have in participating in an exchange program?

18. What convinced you to participate in your exchange program?

If no:

10. How interested are you in participating in an exchange program?

11. What, if anything, deterred you from attending an exchange program?

12. What could be contributing factors to your to participate in an exchange program?

13. Do you believe that your university has sufficiently advertised the available exchange programs?

14. What could your university do to improve the process of participating in an international exchange program?

## **Appendix B: Survey for WPI Students Who Have Participated in the IQP, HUA, or MQP Abroad**

Survey questions for WPI students who have participated in IQP, HUA, or MQP abroad to gain knowledge of their experience abroad

1. What is your field of study?
2. What year are you in?
3. Are you a full time or part time student?
4. What is your gender identity?
5. What IQP, HUA, or MQP project center did you participate in?
6. Was this IQP, HUA, or MQP mostly collaborating with other students in the area or interacting with sponsors/administrators?
7. How well do you feel you assimilated into the culture of your IQP, HUA, or MQP location? (1: Not at all, 5: Extremely well)
8. How did you spend your free time while away on IQP, HUA, or MQP?
9. Where did you spend your working time while away on IQP, HUA, or MQP?
10. Did you engage in activities or opportunities in connection with your project center or sponsors?  
If yes:
  11. What activities or opportunities did you engage in? Specify if they were with students not from WPI.
12. If you went to a foreign-speaking country how often did you speak the language?  
If “Daily,” “2-3 times a week,” “Once a week,” “Every couple of weeks,” or “Once or twice on the entire trip” is selected:
  13. If you spoke the language, was it with people of the country, peers involved in your IQP, HUA, or MQP, sponsors, etc.?
14. On a scale of 1-5, how much did your group work collaboration skills improve after/during IQP, HUA, or MQP? 1 is no improvement, and 5 is the highest level of improvement
15. How useful do you feel participating in your IQP, HUA, or MQP was? Specify if the abroad aspect improved any specific skills (if relevant).

16. On a scale of 1-5, do you feel as though your cultural awareness improved (post IQP, HUA, or MQP experience)? 1 is no improvement, and 5 is the highest level of improvement
17. Did the ability to travel abroad for school influence your decision to come to WPI?
18. Were your expectations for traveling abroad met? Explain.

## **Appendix C: Key Informant Interview for OST Administrators**

Interview questions to administer during our Key Informant Interviews focusing on OST administrators (specifically the questions used interviewing Magdalena Schreiber).

1. Can you briefly describe your role at OST?
2. What are the goals within OST for their global experiences/exchange programs?
3. What experiences do you have with exchange programs at other universities?  
What seemed to work or not work for them based on the university's goals?
4. What do you believe are the key factors contributing to the success of international exchange programs in the STEM field?
5. Can you share any examples of successful exchange programs or internationalization initiatives in the STEM field or at OST that you have been involved with or know about?
6. In your opinion, what challenges or barriers have you encountered or heard about in the process of establishing and maintaining exchange programs? (e.g., financial, language, credit transfer)?
7. How do you think an international exchange program can be adapted to specifically cater to the needs of engineering and computer science students?
8. What would you say is the general Swiss opinion of Americans versus other foreigners overall? Would you say OST has a more open opinion of foreign students?
9. Why specifically are you looking to involve more American students at OST?
10. How do you envision the ideal exchange program for engineering and computer science students? What elements would it include?
11. What type of support services do you think are essential for the success of an exchange program involving STEM students?
12. Would you be available for an additional follow up interview if necessary?



## **Appendix D: Key Informant Interview Questions to Administer Focusing on Cultural Adjustment**

Interview questions to administer during our Key Informant Interviews focusing on the cultural adjustment of moving to a new country (specifically for Professor Nancy Burnham):

1. What is your name?
2. What country are you from/what countries have you lived in?
3. When did you first come to Switzerland? How old were you?
4. Was your purpose for school, work, etc.?
5. Can you describe your initial impressions of Swiss culture when you first arrived?
6. What reasons did you have for coming to Switzerland? Do you feel that you were treated differently in different situations?
7. What were some of the most striking cultural differences you noticed between Switzerland and the United States?
8. Have you had the opportunity to engage with Swiss locals and What have been your observations about their attitudes towards Americans?
9. In your interactions, have you noticed any Swiss generalizations or misconceptions about Americans?
10. Can you share any experiences where you felt your American background was either an advantage or a disadvantage in Switzerland?
11. How do you feel your time in Switzerland has influenced your views on American culture or policies?
12. Have you noticed any Swiss customs or practices that you wish were more prevalent in the United States?
13. What aspects of Swiss culture do you find most challenging to adapt to?
14. Do you feel that your experience in Switzerland has changed your perspectives or goals in your career or personal life?
15. Would you be available for an additional follow-up interview if necessary?

## **Appendix E: Key Informant Interview Questions to Administer Focusing on Cultural Adjustment**

Interview questions to administer during our Key Informant Interviews focusing on the cultural adjustment of moving to a new country (specifically for David Court):

1. What is your name?
2. Can you walk us through your decision to move from Canada to Switzerland 30 years ago? What initially drew you to Swiss culture?
3. Over the past three decades, how have you seen Swiss culture evolve, and how has your perception of it changed?
4. Can you highlight some of the key cultural differences between Canada and Switzerland that have stood out for you over the years?
5. How do you think the Swiss perception of Canadians differs from their perception of other nationalities, including Americans?
6. In your experience, have you come across any Swiss generalizations or misconceptions about Canadians? How do they compare to those of Americans?
7. Can you share some challenges you faced when you first moved to Switzerland, and how you overcame them? Do any of these challenges still persist?
8. How do you think your long-term residence in Switzerland has impacted your career and personal development compared to if you had stayed in Canada?

## **Appendix F: Key Informant Interview Questions to Administer to Experts in Bilateral Exchanges**

Interview questions to administer during our Key Informant Interviews focusing on experts in bilateral exchange administration (specifically for Dean John McNeill):

1. Can you briefly describe your role at WPI? What work do you specifically do with the global office?
2. Do you work on accepting/transferring credits from the exchange programs, if they do not directly fit in with WPI credits? (In terms of ABET and graduation requirements)
3. What goals do you have for global projects at WPI?
4. When did WPI start working towards having projects globally?
5. Before there were similar opportunities for students that we have now, what did the 4 years at WPI look like?
6. Can you tell us a little bit more about “The WPI Plan”?
7. What would you say differentiates the WPI global office from global offices at other schools?
8. Do you think the way WPI offers global experiences is beneficial to students (why/why not)?
9. Why would you say it’s important for students to have a global or “World Class” experience?

## **Appendix G: Key Informant Interview Questions to Administer to Experts in Bilateral Exchanges**

Interview questions to administer during our Key Informant Interviews focusing on experts in bilateral exchange administration (specifically for Professor Aaron Sakulich):

1. What is your name?
2. Can you describe your usual role at WPI? What work are you currently doing while on sabbatical?
3. What are your main goals that you are aiming to achieve while you are in Panama?
4. Who are you working with while you are in Panama?
5. Are there any universities that you've worked with or experienced that had a successful foreign exchange program?
  - a. What did it look like?
  - b. How do they compare to what WPI does?
  - c. What worked and didn't work in their programs from what you have noticed?
  - d. How do the needs of the U.S. students in programs compare to those from other countries if you've noticed anything?
6. Based on your experience in Panama what key factors have you found that have most contributed to international programs there and how could other countries adapt to that model?
7. In your experience, have you noticed any challenges or advantages American students have had or faced during international programs?
8. Are there any practices or customs you've seen from other schools or programs in Panama that WPI or another school could learn from that could enrich International programs?

## **Appendix H: Key Informant Interview Questions to Administer to Experts in Bilateral Exchanges**

Interview questions to administer during our Key Informant Interviews focusing on WPI administration in bilateral exchange (specifically for Krista Miller and Kathleen Head):

1. Can you briefly describe your roles at WPI?
2. What are the goals within WPI for their global experiences/exchange programs?
3. What experience do you have with exchange programs at other universities?  
Which ones specifically? What seemed to work or not work for them based on their university's goals?
4. What do exchange programs look like within WPI, working with another university or as HUA etc.?
  - a. Are they bilateral?
  - b. Are they all for undergraduates or are there programs for grad students (master's)?
5. How does the program work with ABET to maintain accreditations for credits?
6. Pricing for the program, typically if bilateral exchange there is only a small fee, while maintaining home school
7. What would the process be of creating new partnerships with foreign institutes?
8. Would WPI students be able to easily go abroad to take classes (a more traditional exchange setting)? (Not as important)
9. What requirements are there for WPI students to partake in one of these programs?
10. Does the global scholarship that all students get apply to these opportunities or is it only for IQP, HUA, and MQP?
11. What do you believe are the key factors contributing to the success of international exchange programs in the STEM field?
12. Can you share any examples of successful exchange programs or internationalization initiatives in the STEM field or at WPI that you have been involved with or know about?

13. In your opinion, what challenges or barriers have you encountered or heard about in the process of establishing and maintaining exchange programs? (e.g., financial, language, credit transfer)?
14. In your opinion, what are some potential barriers or challenges students might face when participating in an exchange program, and how can they be addressed?
15. What type of support services do you think are essential for the success of an exchange program involving STEM students?
16. Would you both be available for an additional follow up interview if necessary?

**Appendix I: Consent Form for Surveys Sent Out to U.S. Students**

As a group of students from Worcester Polytechnic Institute (WPI) in Massachusetts, United States, we would like to invite you to participate in a survey for our research to learn more about the U.S. involvement in international exchange programs and how to improve them.

The purpose of our research is to increase the participation of U.S. STEM students in international exchange programs. The kind of information that we aim to get from the survey is about common motivators, barriers, and potential opinions on how to improve those issues in current exchange programs. If an exchange program does not exist at your university, your opinions on how to implement one and your perspective on U.S. exchange programs are appreciated. We anticipate that the survey should take about 10 minutes.

This is a collaborative project between the Eastern Switzerland University of Applied Sciences (OST) and WPI, and your participation is greatly appreciated. Information from our project will be published in a publicly available academic document at the end of our term. No names or identifying information will appear in any of the project reports or publications unless you give us consent to do so. Your participation in this survey is completely voluntary and you may withdraw at any time. This also means that you can skip any questions that you want.

For more information about this research and the rights of research participants, you may contact us by email at [gr-swiss-exchange@wpi.edu](mailto:gr-swiss-exchange@wpi.edu) or the Institutional Review Board (IRB) Manager (Ruth McKeogh, Tel. 508-831-6699, Email: [irb@wpi.edu](mailto:irb@wpi.edu)) or Human Protection Administrator (Gabriel Johnson, Tel. 508-831-4989, Email: [gjohnson@wpi.edu](mailto:gjohnson@wpi.edu)).

Thank you very much!

I understand that this survey is completely voluntary

## Appendix J<sup>2</sup>: Consent Form Sent Out to Those Interviewed

As a group of students from Worcester Polytechnic Institute (WPI) in Massachusetts, United States, we would like to invite you to participate in an interview for our research to learn more about the U.S. involvement in international exchange programs and how to improve them.

The purpose of our research is to increase the participation of U.S. STEM students in international exchange programs. The information we aim to get from this interview is about the Eastern Switzerland University of Applied Sciences (OST) and its goals regarding foreign exchange programs, along with other universities. Additionally, we hope to gain insight into the culture that American students engage in while in Switzerland. We anticipate that this interview should take about 30 minutes.

This is a collaborative project between the OST and WPI, and your participation is greatly appreciated. Information from our project will be published in a publicly available academic document at the end of our term and we can share a copy of our results if you are interested. No names or identifying information will appear in any of the project reports or publications unless you give us consent to do so. Your participation in this interview is completely voluntary and you may withdraw at any time. This also means that you can skip any questions that you want.

For more information about this research and the rights of research participants, you may contact us by email at [gr-swiss-exchange@wpi.edu](mailto:gr-swiss-exchange@wpi.edu) or the Institutional Review Board (IRB) Manager (Ruth McKeogh, Tel. 508-831-6699, Email: [irb@wpi.edu](mailto:irb@wpi.edu)) or Human Protection Administrator (Gabriel Johnson, Tel. 508-831-4989, Email: [gjohnson@wpi.edu](mailto:gjohnson@wpi.edu)).

Thank you very much!

I, \_\_\_\_\_, consent to having this interview recorded and having my name attached to any reports that are made.

X \_\_\_\_\_

*Sign here*

*Date*

<sup>2</sup> The consent form that was sent out (appendix J) has discrepancies between each interviewee regarding intent for the interview and the expected information we aimed to receive.