Focus group analysis of engineering Collaborative Online International Learning (COIL+) compared to short-term study abroad programs

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Abstract

In recent years, the emphasis on global experiences for undergraduate students has increased. Institutions and educators have worked to create more opportunities for international collaboration for students. One is Collaborative Online International Learning (COIL), a pedagogical method that allows for a deepened global engagement for students without international travel. The COIL method connects students and faculty from different countries to explore a subject, theme, issue, or idea through a project-based learning (PBL) experience. COIL presents many opportunities for virtual engagement to solve the lack of student mobility, as emphasized throughout the pandemic. Our university has expanded on COIL by offering full-semester COIL courses with an optional post-course short-term study abroad program. This experience is known as COIL+. Currently, more research is needed to seek to understand how these experiences impact students. We compare student learning outcomes among participants in COIL+, COIL, and traditional short-term study abroad programs (No-COIL). The objective of this study was to qualitatively analyze undergraduate students' COIL+ experiences compared to traditional short-term programming to comprehend and assess associated benefits, challenges, and opportunities. We conducted in-depth focus groups with eight questions in groups ranging from one to seven students to understand their experience in the program and at the university since the completion of the program. A student moderator guided these groups, and they continued without specific length restrictions as long as students provided feedback on the questions. We analyzed the transcripts from the focus groups using an inductive approach to coding the data to uncover themes. Preliminary results suggest that students discussed the following themes: educational outlooks, class applications, cultural interaction and exchanges, cultural intelligence, career outlooks, skill development, and advice to other students. Our draft paper discusses preliminary results by comparing and contrasting the No-COIL, COIL, and COIL+ student responses.

Keywords: Collaborative Online International Learning, COIL, Short-term study abroad programs, Faculty led study abroad, Focus groups, Undergraduate engineering education

1. Introduction

Background

Short-term study abroad programs offer valuable opportunities for students to engage in international travel during their time at a university. These programs have various lengths and destinations that can correlate to a specific course or opportunities such as internships [1]. Recent studies have conveyed the significance of assessing study-abroad learning experiences [2]. While various methods and frameworks have been reviewed in these circumstances [3], research suggests that students who study abroad acquire new general and cultural outlooks and perspectives [4].

Throughout an education in engineering, interdisciplinary learning is frequently encouraged. These experiences are often facilitated by participation in short-term study-abroad programs [5]. Recently, studies assessing the impact of these programs on engineering students have been completed. One study conducted video analysis reflections to assess the students' learning outcomes [6]. The students in this research initially focused on communication and environmental factors, gradually shifting their reflection points to include cultural reflections later in the program. Students also connected their cultural observations to their engineering field.

Existing framework

Collaborative Online International Learning (COIL) is a crucial tool developed in the early 2000s to provide intercultural engagement among students [7]. This pedagogical method facilitates deepened global engagement for students without the need for international travel by connecting students and professors with people worldwide to collaborate on projects and discussions [7]. Studies on COIL mainly reveal positive impacts with students focusing on global engagements within both personal and professional settings [8]. Furthermore, COIL enhances student collaboration and communication skills [9]. Research comparing pre-COIL and post-COIL revealed that students were more receptive to learning about culture, religions, and traditions when compared [10].

COIL gained popularity as a pedagogical method during the COVID-19 pandemic. Several professional development engagement methods exist in the COIL virtual framework, such as online synchronous, online asynchronous, and hybrid in-person and online [11]. Through these professional development opportunities, each stakeholder can gain expertise in international relations, educational development, and educational technologies [11]. Students who participate in virtual programs are active learners who perform meaningful activities and reflect on them [11]. Through the COIL virtual framework, students can collaborate with peers from various cultural backgrounds, connecting them to intercultural competencies and global awareness.

One of the primary valuable pedagogies in COIL programming is the incorporation of contact sessions with students abroad [12]. Depending on the course, the content of these meetings can vary significantly. As Doscher explained, each COIL classroom fosters an environment that reflects, rethinks, and redesigns pedagogical practices to promote linguistic inclusivity [11], [13]. Another study compared No-COIL and COIL students' collaboration skills while working on group projects [14]. In one case [15], environmental engineering students collaborated on a project

with students in Mexico and results demonstrated that the students' positive experience improved their collaboration skills. Extending this pedagogical approach beyond the classroom, COIL+ courses have an additional travel component that enables faculty and students to engage directly with the students, industries, and environments in country.

Despite the popularity of COIL programs, a notable gap in the research exists when comparing the variations of COIL and No-COIL programs. Few studies indicate the impact difference between a No-COIL and COIL experience on the students, and more details are needed when comparing No-COIL, COIL, and COIL+ groups. The goal of this work is to capture qualitative aspects that were not represented in prior survey data. In the following sections, the results presented show significant differences when comparing No-COIL, COIL, and COIL+ students.

Research question (RQ)

This study aims to address this understanding gap by answering the following research questions:

1) How do different international program structures, specifically No-COIL, COIL, and COIL+, influence students' learning experiences, cultural perceptions, career impacts, and skill development?
2) What are the differences in experiences among No-COIL, COIL, and COIL+ students?

2. Methods

Design

This study uses qualitative methods to assess the experiences and perceptions of the students in the No-COIL, COIL, and COIL+ courses. We conducted in-depth focus groups with eight questions in groups ranging from one to seven students to understand their experience in the program and at the university since the completion of the program. These groups were guided by a moderator and lasted in length without restriction as long as students provided feedback on the questions. Students received the eight questions for their review and consideration before the meeting. We analyzed the transcripts from the focus groups using an inductive approach to coding the data to the discovered themes.

Context

The project studied students in several engineering courses at a large Midwestern University in the United States in the spring of 2023. Courses are designed to have either a No-COIL, COIL, or COIL+ component. No-COIL classes are structured only to have a short-term faculty-led program with most of the interactions taking place during the travel program. A COIL course involves a fully virtual classroom that collaborates with international partners (in the courses studied, these are start-up companies). COIL+ courses include technical or service projects throughout the course prior followed by a short-term faculty-led program.

Participants

All 59 students who participated in No-COIL, COIL, or COIL+ programs were eligible and invited via email to participate in focus groups. Of the 59 eligible students, 22 (64% Female, 36% Male)

contributed to focus groups. The student participants were from a variety of majors: Aerospace Engineering (27%), Materials Science and Engineering (4.5%), Industrial and Enterprise Systems Engineering (9.1%), Chemical & Biomolecular Engineering (4.5%), Physics (4.5%), Nuclear, Plasma & Radiological Engineering (18.2%), Mechanical Engineering (9.1%), Agricultural Engineering Sciences (9.1%), Earth, Society, and Environment (4.5%), Computer Science (4.5%), and Electrical Engineering (4.5%). Students were in different stages of their academic career with 22.7% in their first year, 22.7% in their second year, 50% in their third, and 4.5% in their fourth year. Focus groups were organized to contain students who were registered in the same course.

Demographic Information

Figure 1 indicates the number of students in each course. Twenty-two students participated in total—nine in the No-COIL group, one in the COIL group, and 12 in the COIL+ group. The two No-COIL classes traveled to either Italy or Guatemala. The COIL course was the ENG Global group. The COIL+ groups traveled to either Brazil or Italy. Overall, more female students than male students participated in each of the focus groups as depicted in Figure 2. This observation is consistent with other studies that have found the vast majority of populations for study abroad programs are female [16].

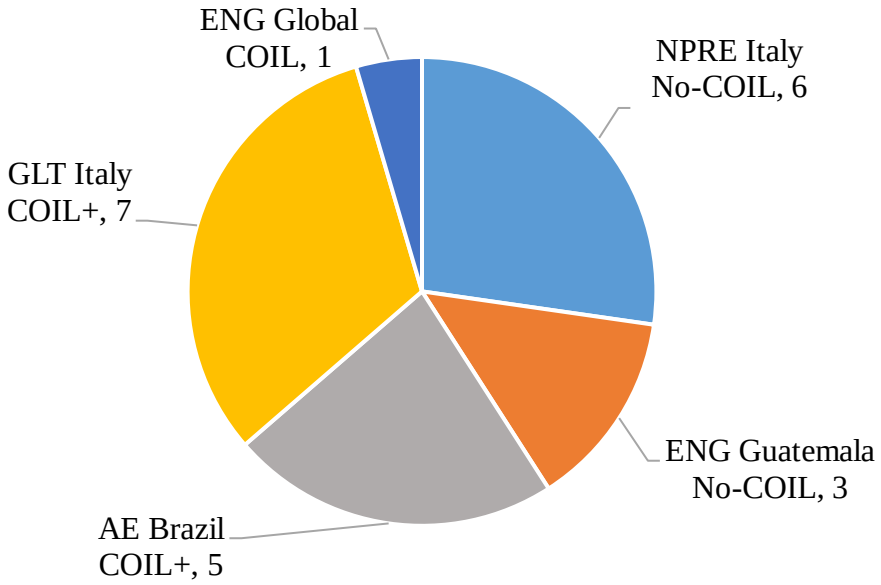

Figure 1. Focus Group Student Population: Class and Destination Breakdown Between Classes with Number of Students

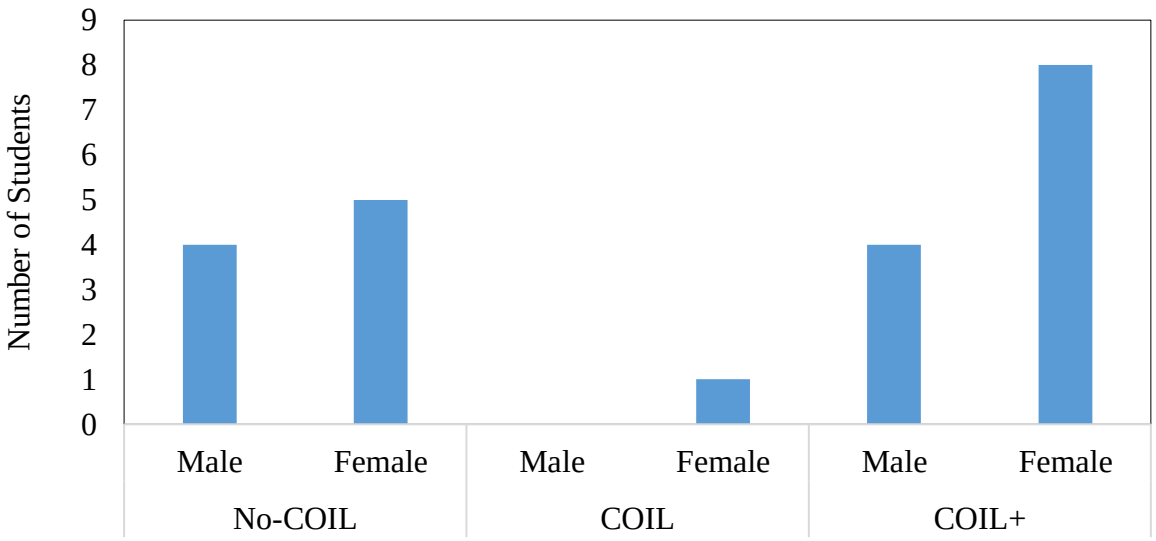

Figure 2. Gender Breakdown Between COIL Groups

Data Collection

The program participants received a link via email to schedule a focus group meeting between the moderator and the students. An email template was created and interchangeable between the participants of each type of COIL course. After the moderator sent the email, students would fill out the time that would be best for them to attend the focus group. Once a meeting time was identified a confirmation email was sent to participants confirming the time and sharing the meeting link. The moderator shared the slides and questions in the confirmation email to prepare students for the focus group.

Sessions were recorded during each focus group meeting. Closed captioning was enabled for accessibility needs during the meeting. The previously shared slides were screen-shared with all the participants, allowing them to read the questions in addition to the questions being read aloud. The moderator introduced themself after all participants logged into the focus group meeting. After the introduction, the moderator started to ask each question, displayed in Table 1, giving students ample time to answer each question.

Table 1. Questions included in the COIL focus groups.

	Questions
1	Think back to who you were and how you thought about things when you were just starting out on this experience. How do you feel you changed from then to now? How do you see yourself in a wider global context now?
2	What specific parts of your global learning experience gave you a new outlook, or a new way of thinking about how you relate to the world?
3	Tell me about some of the ways your global learning experience changed your perception of other cultures, or this other county? Can you give me a specific example?
4	In class you took a cultural intelligence assessment to learn about yourself and how you approach working in multicultural situations. Tell me how you saw the work that you did in class related to cultural intelligence show up in your global learning experience?
5	Do you think this experience will affect your career? How or in what ways?
6	Developing non-technical skills are an important part of this program (skills such as communication, teamwork, problem-solving, leadership, etc.). What are some of the non-technical skills you feel you developed as a result of this experience?
7	Thinking back on all the experiences you had, what are one or two things that most resonate with you? What did you learn about yourself?
8	What would you tell other students about why this experience is valuable?

Each question was designed to be open-ended to provide flexibility for students to answer the questions based on their experiences. They had the freedom to respond in any way they chose and not all students provided input on each question. Within this collaborative focus group environment, each response provided by a student served as a foundation for other students to build upon. At the end of the meeting, the moderator thanked everyone for their contributions to the research. The moderator then saved the transcripts for further review, transcription, and analysis.

Analysis Procedures

A researcher checked and, if necessary, rewrote the transcripts to facilitate a streamlined process for further review. Subsequently, the researcher conducted a thematic analysis of the focus group responses to determine the impact of the COIL curriculum compared to a program without COIL. The researcher logged and organized each response into a document for coding according to defined themes established after the data collection. The themes included general outlooks, cultural interactions, cultural intelligence, career outlooks, skill development, and advice to other students. After reviewing the participants' responses, each response was coded in a binary method (0, 1) where if a theme was identified as present, it received a 1. Specific details were also listed in a

separate column to see group distinctions. The researcher aggregated the responses tagged under each theme to compare each COIL course type. Notably, not all themes were addressed in every question. The responses were coded twice, at two different points, by a single researcher to determine the consistency of the codes.

3. Results

Each response given during a focus group was coded under a specific theme and given a one to three-word phrase to explore the impact of each of three types of COIL courses. The themes were totaled for comparison to the other groups. This study led to interesting findings for each question, where there were differences among course types in overall outlooks, cultural interactions, skill development, and career impacts between groups.

Impact of No-COIL, COIL, and COIL+ pedagogies on students - Global Context Change

> Students were asked, "Think back to who you were and how you thought about things when you were just starting out on this experience. How do you feel you changed from then to now? How do you see yourself in a wider global context now?"

The findings revealed in the figures below show the comparisons between each course type. Figure 3a suggests that in the No-COIL and COIL+ programs, students view themselves as more culturally and community-aware. Students from the No-COIL group addressed travel perspectives, family relations, and other self-awareness attributes. The COIL and COIL+ students did not contain these outlook responses. The COIL and COIL+ groups noticeably discussed more overall outlook changes on working in an international setting. Zero students from the No-COIL group talked about changes in their work or career from their study abroad opportunity. On the topic of cultural interactions, there were two categories that students talked about in their focus group answers, shown in Figure 3b. Several students from the No-COIL and COIL+ groups indicated characteristics of the people at their designated locations. Additionally, one student from the COIL+ group talked about the operations within the visited country. In Figure 4a, there are two categories under the career outlook theme. Two students from the COIL+ group outlined their thoughts about working outside of the country. One student from the COIL class discussed leadership skills when answering the first question. Figure 4b on skill development shows the final theme represented in the focus groups. Students from the No-COIL group talked about the growth of their independence and confidence from the short-term program abroad. The COIL student addressed the growth of their professionalism from this experience.

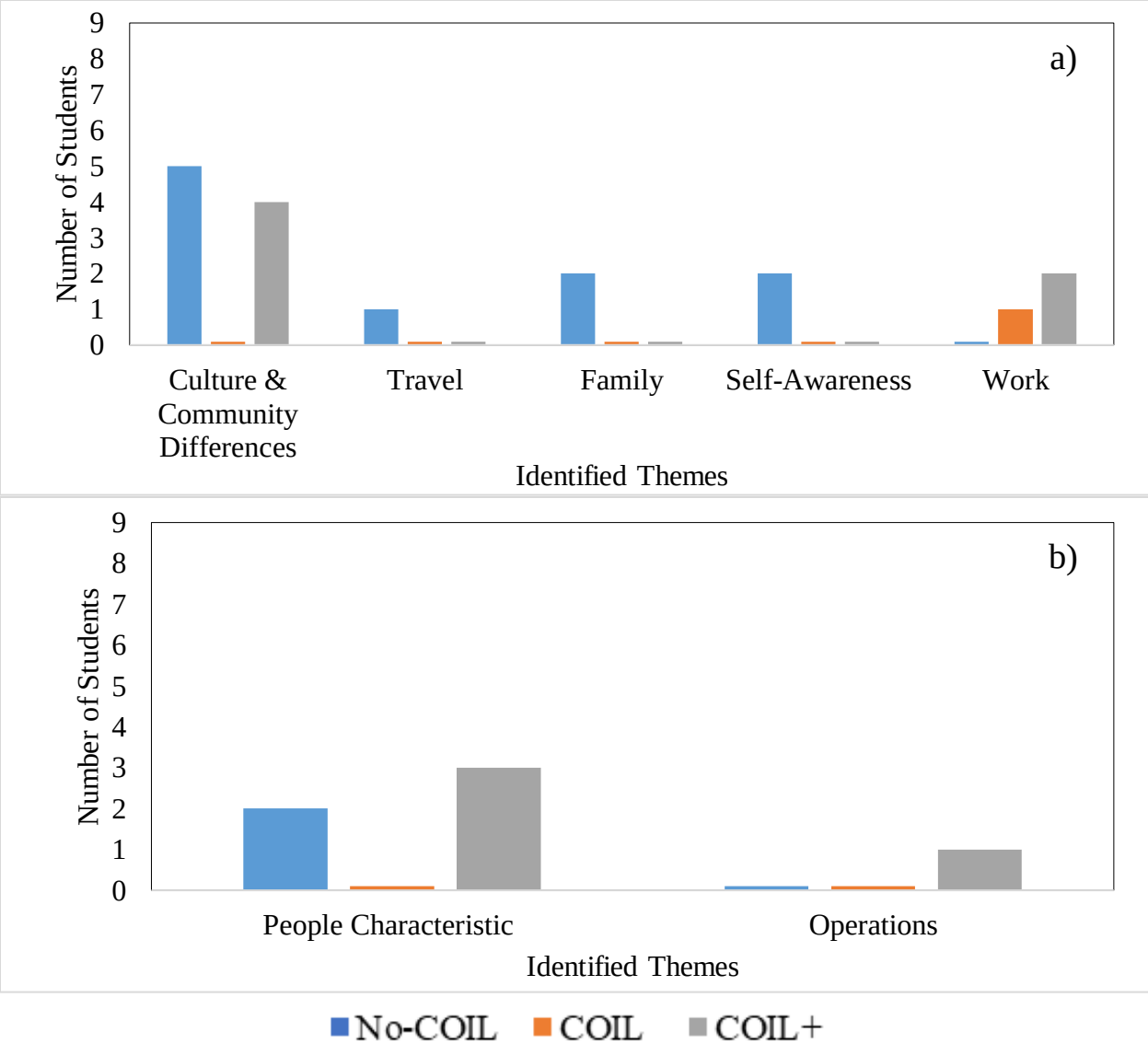

Figure 3. Wider Global Context Changes: 3a. General Outlook Changes, 3b. Cultural Interactions Mentions

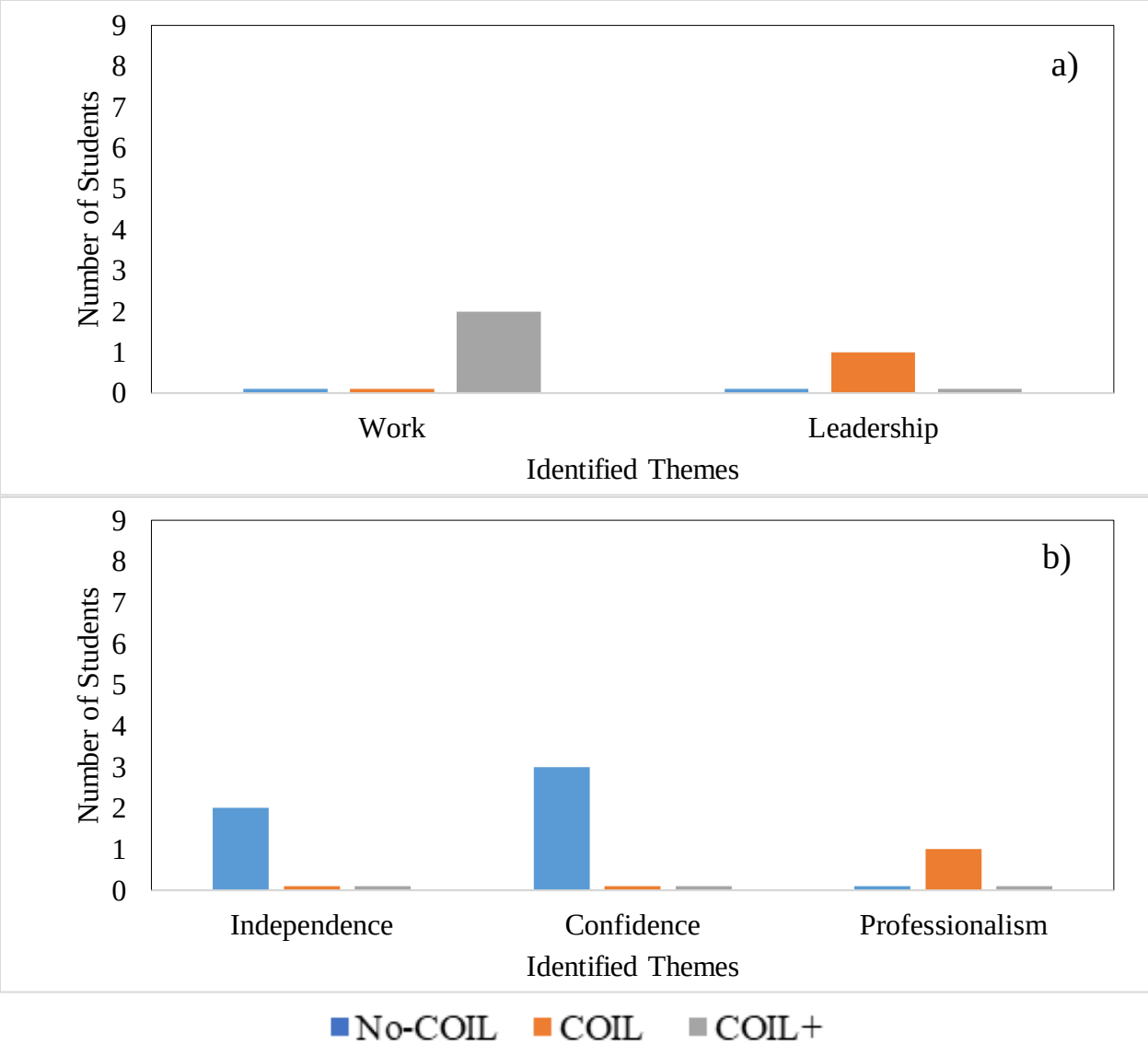

Figure 4. Wider Global Context Changes: 4a. Career Impact Mentions, 4b. Skill Development Impact

Impact of No-COIL, COIL and COIL+ pedagogies on students - New Outlooks Relating to the World

> Students were asked, "What specific parts of your global learning experience gave you a new outlook, or a new way of thinking about how you relate to the world?"

Figure 5 and 6 below presents the coded data based on the second question. In Figure 5a, while answering this question, the majority of the students focus on the cultural perspectives and diverse outlook changes while in a new part of the world. Students from the COIL+ and No-COIL programs discussed their views on the city they traveled to and worldviews. A COIL+ student elaborated on an additional community-centered response. Another outlook perspective from the COIL student was the economic differences. Figure 5b illustrates cultural interaction responses

from the students. Overall, students from the No-COIL and COIL+ groups discussed a connection to the general culture. Their responses encompassed the arts, sciences, and the people. No-COIL students talked in depth about the location and student connections from their short-term program. COIL+ students addressed aspects of volunteering in the observed community. The COIL student answered the questions relating to consumer interactions. Cultural intelligence responses are coded and portrayed in Figure 6a. Students in the COIL+ program discussed appreciation of the arts of unfamiliar cultures. One student commented on martial arts, and another on the culture's music. One student from the No-COIL group talked about the leadership in the country. Several students from the No-COIL and COIL+ groups discussed the language. They elaborated on the barrier and the various discussions with the local people. In Figure 6b, the student responses contained various skills developed based on their experience in the COIL courses. The No-COIL students discussed using their adaptability and resilience skills while navigating a new environment. Students from this group also showed growth in their social interactions. They made new friends and communicated with other students on the program while in the country. With these comments, students talked about how their overall confidence changed from their experiences with students in both the No-COIL and COIL+ groups. The COIL+ students mentioned additional factors of recognizing bias during their focus group meeting. The COIL student mentioned another interaction and consumer interaction skill development.

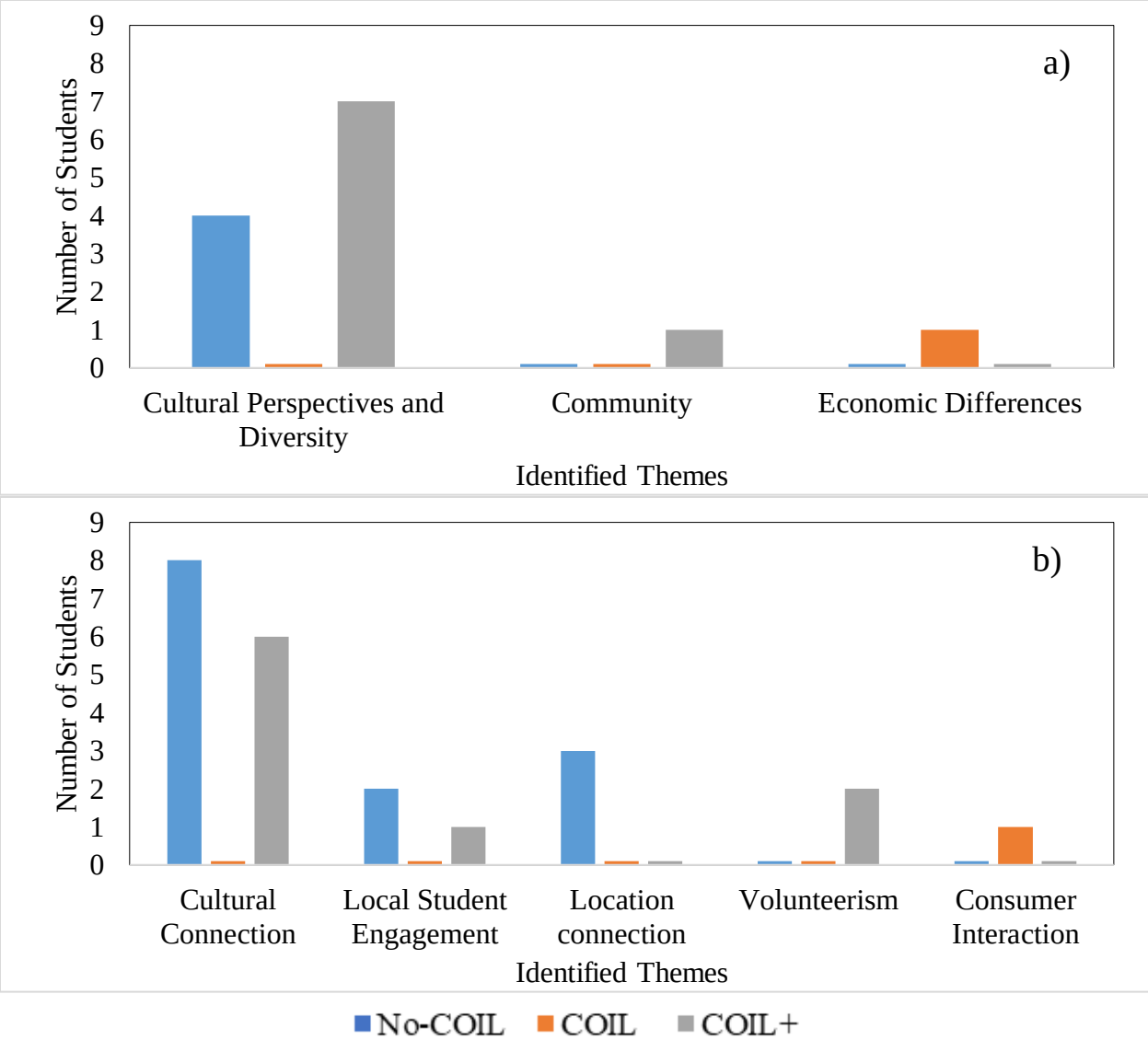

Figure 5. Fresh Perspectives on the World: 5a. General Outlook Changes, 5b. Cultural Interactions Mentions

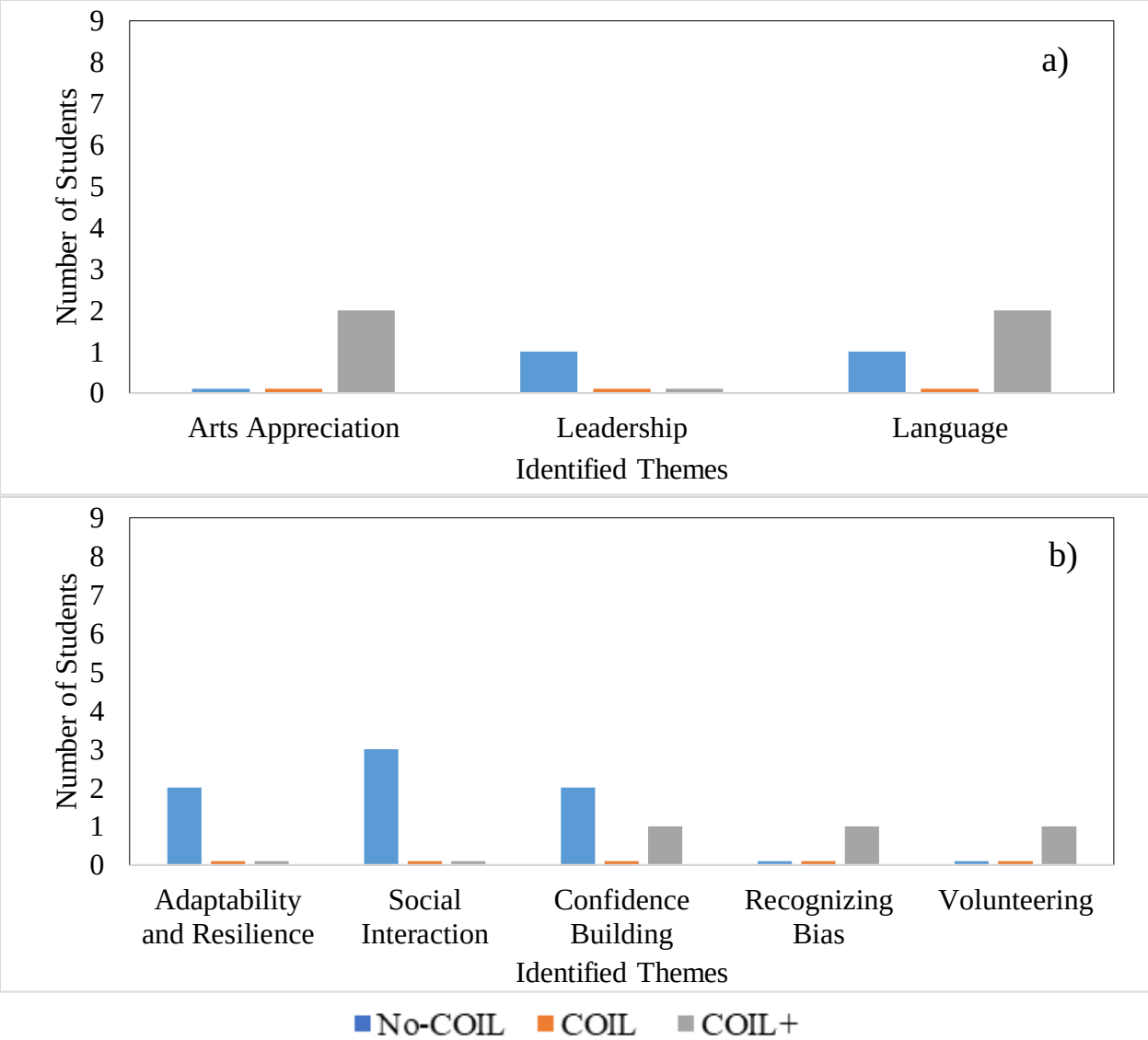

Figure 6. Fresh Perspectives on the World: 6a. Cultural Intelligence, 6b. Skill Development Impact

Impact of No-COIL, COIL, and COIL+ pedagogies on students - Change in Perception

> Students were asked, "Tell me about some of the ways your global learning experience changed your perception of other cultures, or this other county? Can you give me a specific example?"

Figure 7 and 8 portrays the general outlook, cultural interaction, and cultural intelligence themes represented in the students' responses. Figure 7a depicts that students from all three types of COIL courses noticed a difference between the U.S. and the country they visited. Students from one of the COIL+ groups mentioned that prosperity can come from anywhere globally. A person can have a "better" life no matter the location. The last theme the COIL+ students from one class included was an observation of a sense of community. The people at that location were selfless and ready

to help anyone. The interviews documented additional cultural interactions in Figure 7b. Students from both No-COIL and COIL+ groups discussed cultural differences. An example a student gave was the experience of a culture's food. No-COIL and COIL students discussed recognizing bias and stereotypes when interacting with people and other cultural exchanges. The NO-COIL and COIL+ students mentioned social interactions. Students enjoyed conversing with the local students and community members. The COIL student again talked about consumer interactions from their interactions. Included in the students' responses was the theme of cultural intelligence. Students from the No-COIL group addressed observations related to family orientations and social bonding with locals. From this question, students from the No-COIL and COIL+ groups discussed cultural differences. They noted that not all students or locals have the same experiences as the population of the U.S. One student reminisced that other cultures have more accessibility options than other parts of the world.

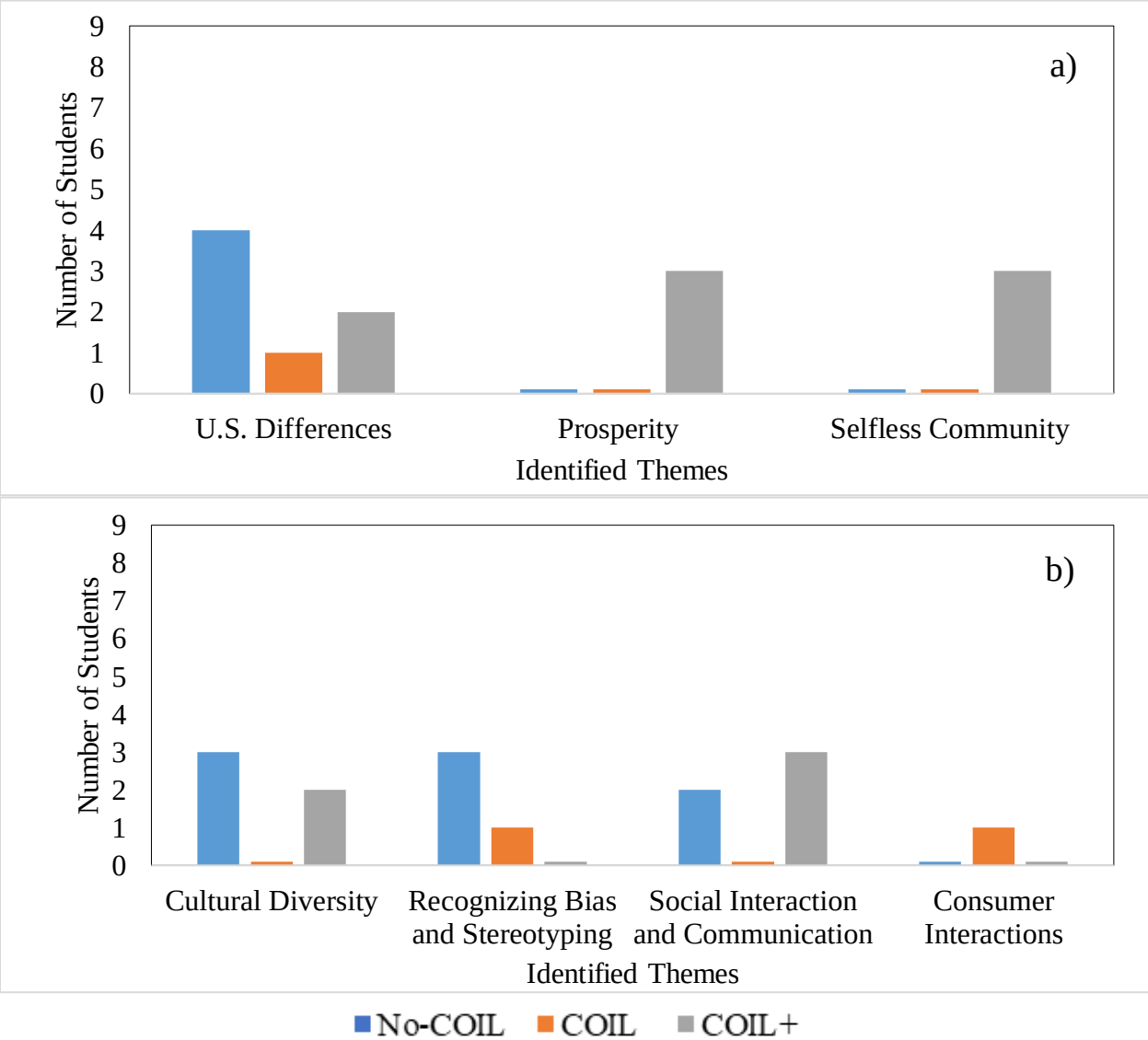

Figure 7. Changes in Cultural Perceptions: 7a. General Outlook Changes, 7b. Cultural Interactions Mentions

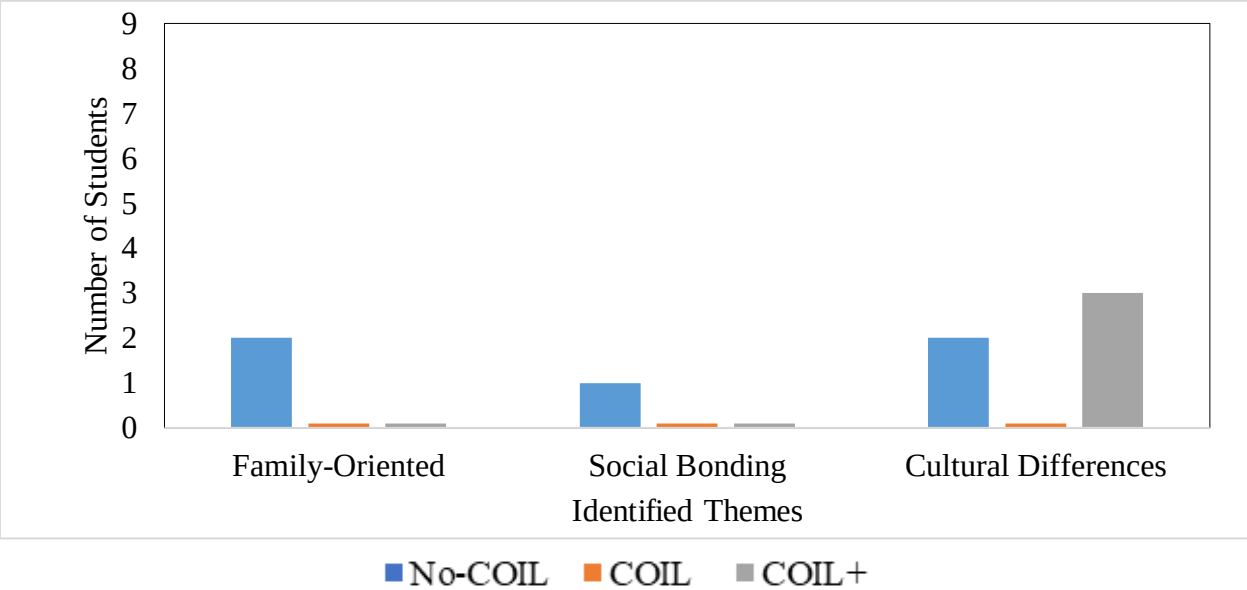

Figure 8. Changes in Cultural Perceptions: Cultural Intelligence

Impact of No-COIL, COIL, and COIL+ pedagogies on students - Cultural Intelligence

> Students were asked, "In class you took a cultural intelligence assessment to learn about yourself and how you approach working in multicultural situations. Tell me how you saw the work that you did in class related to cultural intelligence show up in your global learning experience?"

The students in the No-COIL group had general outlook changes based on the question, represented in Figure 9a. The students from this group did not perform the assessment but still answered the questions to the best of their ability. The students from this group brought up points of developing competencies and global learning during the short-term program. One student talked about transitioning from being in the U.S. to their travel location. They discussed that a video call through Zoom was beneficial before traveling. Figure 9b covers the cultural interactions and connections that the students from each program noticed. Students from the No-COIL and COIL+ groups connected to the overall culture during their in country programs. Language, music, and food were the top points brought up during the discussions. A COIL+ student talked about local student engagement through conversations. One student from both the No-COIL and COIL+ groups commented on the location connection. They reviewed scenarios about local food and music. In Figure 10a, students from all groups commented on scenarios that involve cultural intelligence (CQ) [17]. Most students from the No-COIL classes talked about general cultural intelligence topics such as cultural differences, relationships, or cultural adaptability. For the cross-cultural competencies, students from the COIL and COIL+ programs observed the cultural intelligence strategies in action. Many students from each group discussed specific instances of where they used or thought of using the CQ strategies based on the assessment. Skill development was discussed and represented in Figure 10b. Students from the No-COIL and COIL groups discussed when they used their adaptation skills. Students from the same groups were also more self-aware of behaviors and situations. They discussed recognizing bias and included another

example: thinking before speaking to others. The No-COIL and COIL students noted decision-making. They talked about keeping an open mind to new experiences. The final skill covered was collaboration between the locals and fellow students. Students from the COIL and COIL+ group talked about the importance of collaboration.

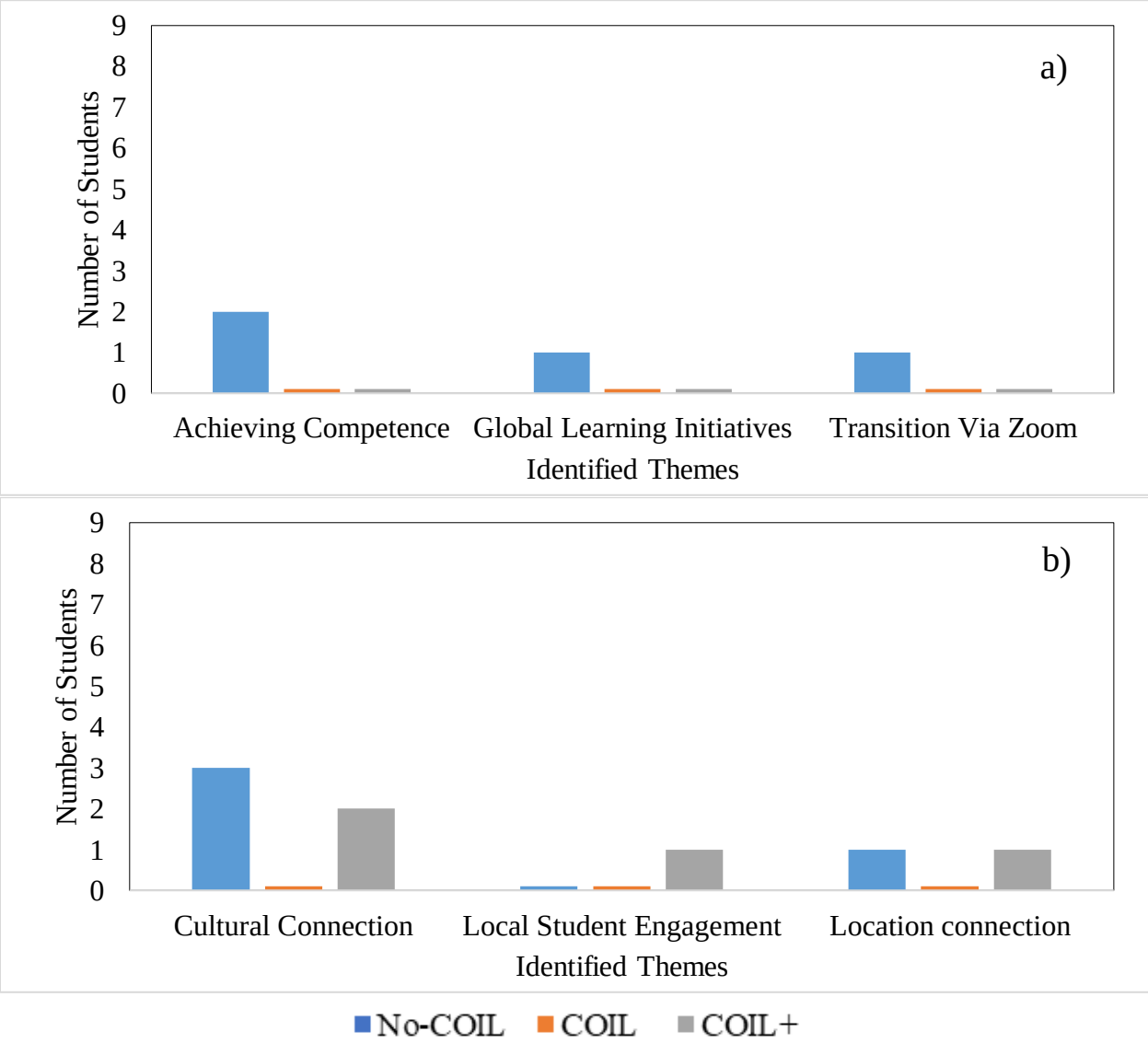

Figure 9. Cultural Intelligence Assessment Application: 9a. General Outlook Changes, 9b. Cultural Interactions Mentions

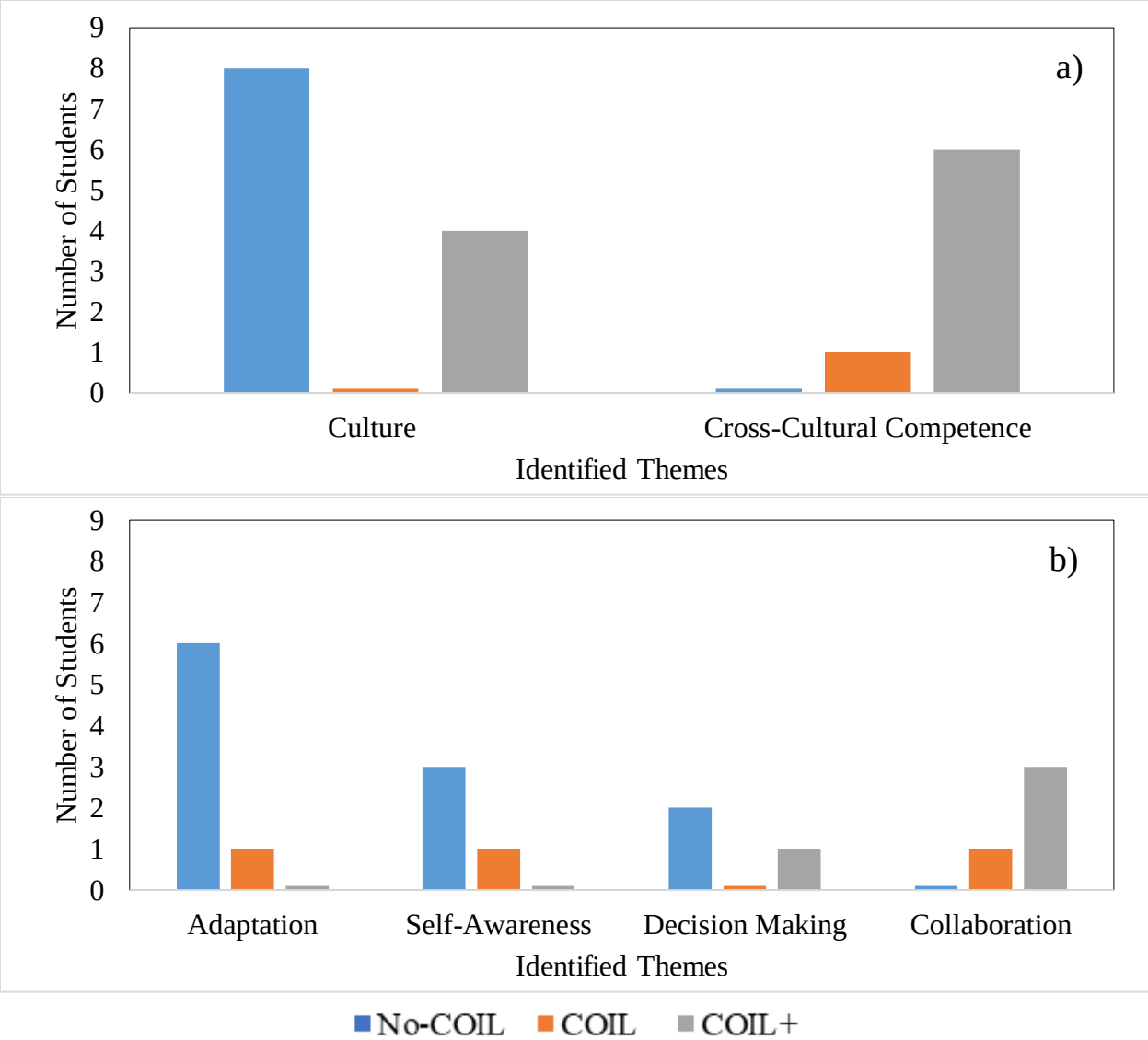

Figure 10. Cultural Intelligence Assessment Application: 10a. Cultural Intelligence, 10b. Skill Development Impact

Impact of No-COIL, COIL, and COIL+ pedagogies on students - Career Impact

> Students were asked, "Do you think this experience will affect your career? How or in what ways?"

Students from each program had various views from their experiences in Figures 11 and 12. Figure 11a incorporates the No-COIL and COIL+ students' openness to future travel to see other parts of the world. Within the students' answers, they covered cultural interaction, as displayed in Figure 11b. No-COIL and COIL+ students talked about the future perspectives of working with other cultures. The majority of the students were from the COIL+ cohorts. Figure 12a depicts a scale where students' career outcomes range from those unaffected by their experiences to those uncertain about the impacts, moderately impacted, and significantly influenced in their career

goals. No students from the three courses discussed a definite lack of impact on their careers. From this figure, students from the No-COIL group said that they are uncertain that this experience will affect their career plans. Students from the No-COIL and COIL+ groups said it has moderately impacted their career choices. Most students were open to working internationally or with people of other cultures. Students from all three courses said these experiences will highly influence their career choices. Additionally, the students' responses encompassed skills gained from these experiences that they plan to utilize in their future careers. Students from the No-COIL and COIL+ groups talked about confidence, adaptability, and communication skills while discussing their future career aspirations.

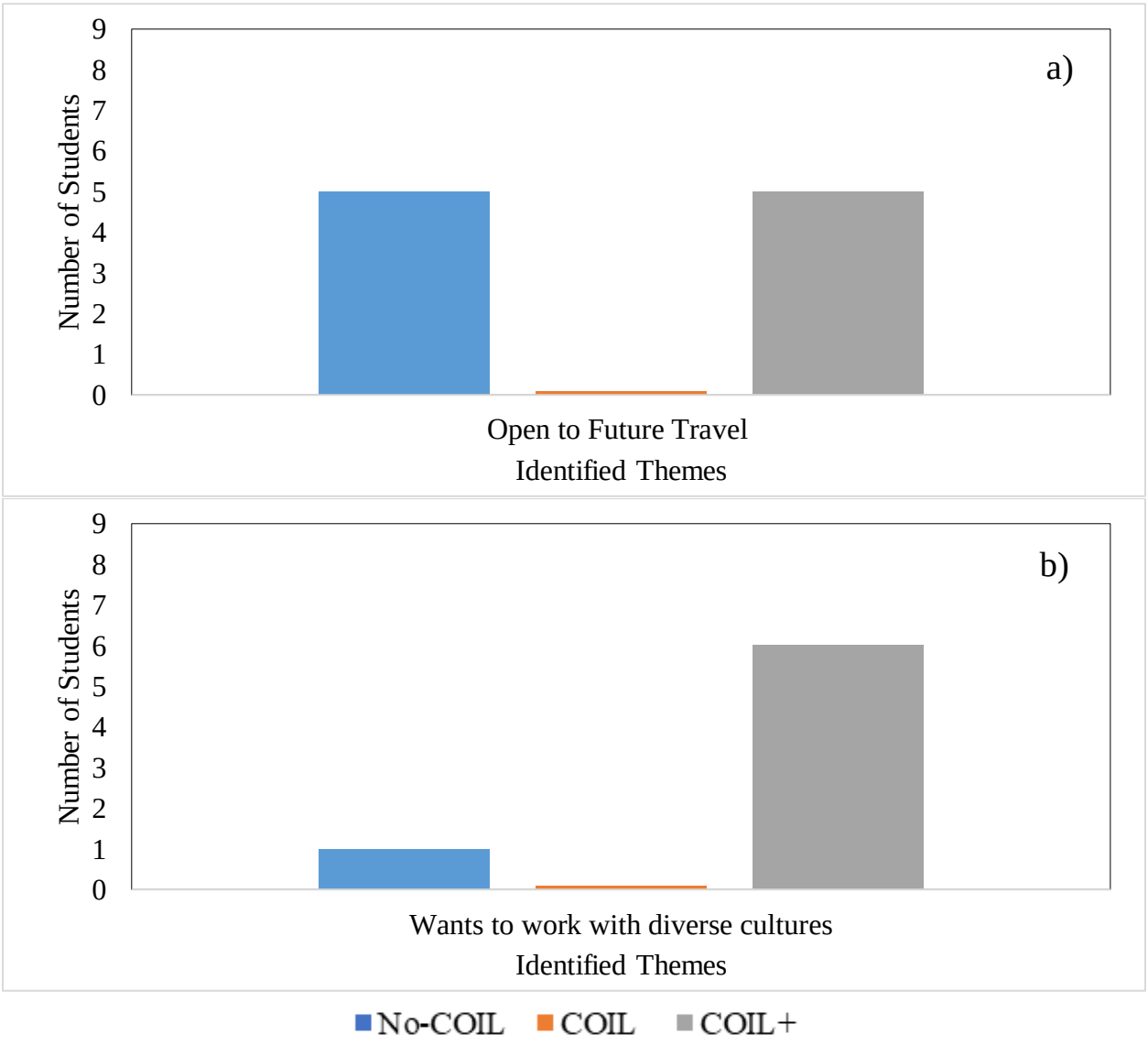

Figure 11. Career Impacts: 11a. General Outlook Changes, 11b. Cultural Interactions Mentions

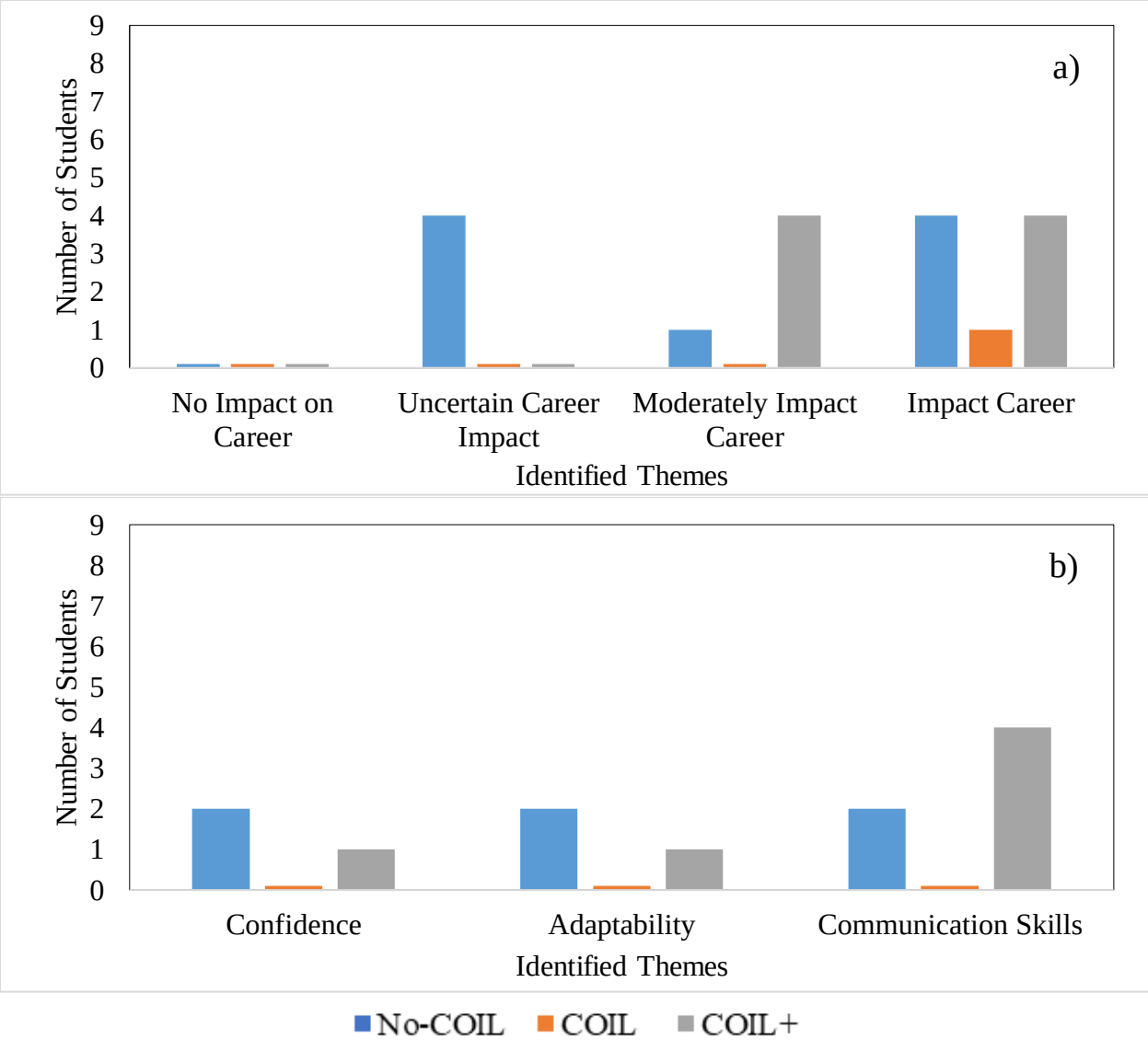

Figure 12. Career Impacts: 12a. Career Impact Scale, 12b. Skill Development Impact

Impact of No-COIL, COIL, and COIL+ pedagogies on students - Non-Technical Skill Development

> Students were asked, "Developing non-technical skills are an important part of this program (skills such as communication, teamwork, problem-solving, leadership, etc.). What are some of the non-technical skills you feel you developed as a result of this experience?"

Figure 13 represents the non-technical skills development from the No-COIL, COIL, and COIL+ groups. More students from the No-COIL group noted that they were more adaptable than the COIL and COIL+ groups. Communication skills were also noted in all three course-type students. The next skills listed are confidence, problem-solving, and collaboration. Both the No-COIL and COIL+ students had instances of discussing these skills.

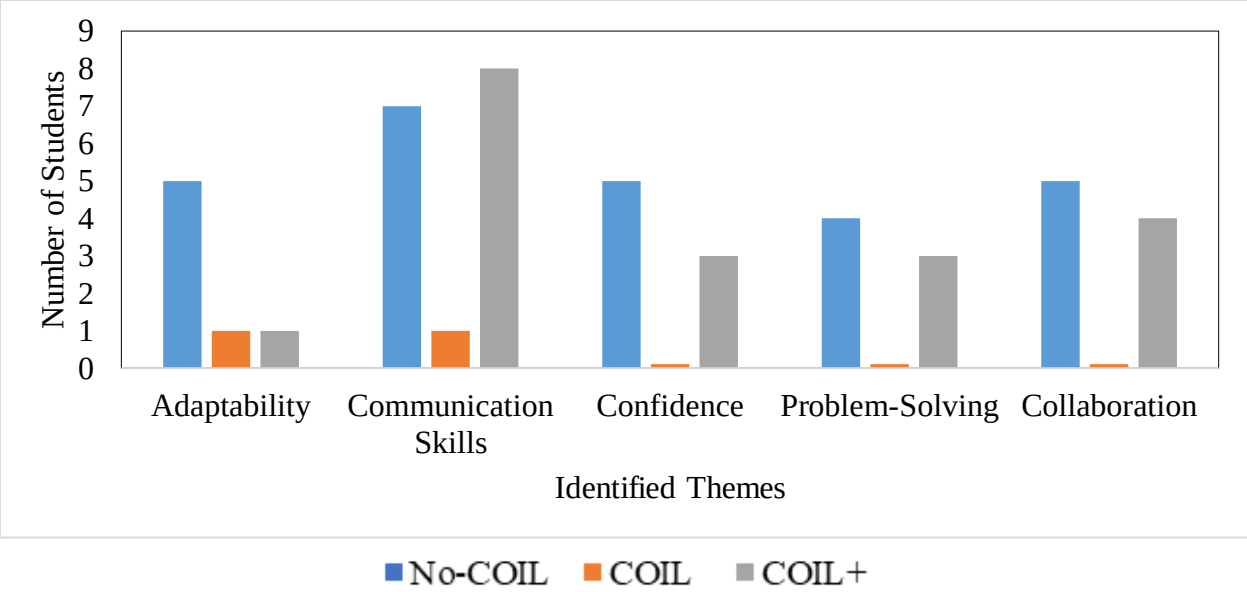

Figure 13. Non-technical Skill Development

Impact of No-COIL, COIL, and COIL+ pedagogies on students - Key Takeaways of Experience

> Students were asked, "Thinking back on all the experiences you had, what are one or two things that most resonate with you? What did you learn about yourself?"

Figure 14 represents the frequency of the themes answered by each student. This figure is displayed this way since the question is open-ended for key memories from individual travels. Regarding general outlook changes, the students from No-COIL and COIL+ had contributing answers. The outlooks mentioned by the No-COIL students talked about general travel. The COIL+ students spoke about community involvement, lifestyles, and volunteering. From the theme of cultural interactions, students from the No-COIL and COIL+ groups talked about specific memories from their program. No-COIL students covered specific places like wine and cheese farms and beaches. Students from COIL+ talked about product sales and local people's emotions. Students from the No-COIL and COIL+ groups communicated their observations on cultural intelligence. Students from the No-COIL group covered an experience with local students sending up a satellite. One student also noted that the students must travel long distances to get to their school. A COIL+ student talked about the differences in careers between countries. The No-COIL and COIL+ students also covered their career outlooks. Both groups of students spoke about working abroad. In the last theme, students from all classes discussed the skills they actively developed. Students discussed relaxation, confidence, respect, communication, and helping others.

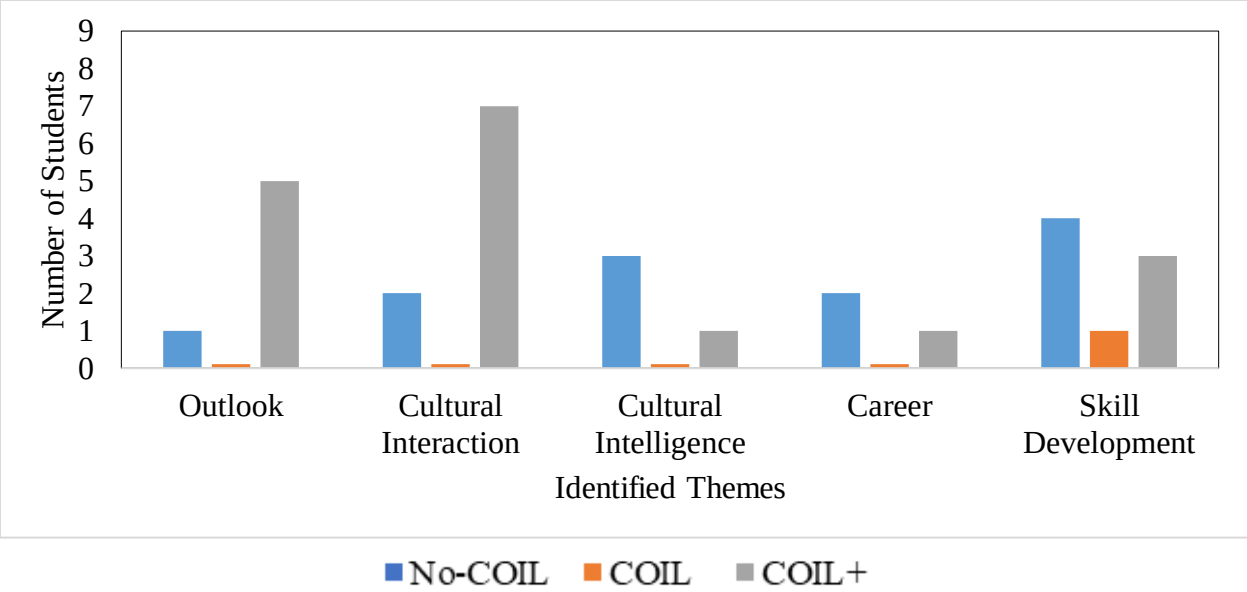

Figure 14. Key Themes from Student Experiences

Impact of No-COIL, COIL, and COIL+ pedagogies on students - Student Sharing Experiences

> Students were asked, "What would you tell other students about why this experience is valuable?"

Figure 15a lists the themes of students' responses. Students from the No-COIL and COIL+ groups commented on the general outlooks when describing their experiences to other students. The No-COIL and COIL+ students discussed instances of being uncomfortable with growing skills. Another conversation from the No-COIL group used the word "vacation" to describe their program. Most students from the No-COIL group covered cultural interactions, while one student was from COIL+. They talked about the language and connection to local students. For cultural intelligence, students from the COIL+ and No-COIL groups discussed the understanding of cultural differences. More COIL+ students addressed this theme. When advising other students, the COIL and COIL+ groups covered career impacts compared to No-COIL. Students from these groups commented on how this opportunity has given them a "head start" and assistance for their career plans. Other students covered the vast connections they made for working internationally. For skill development, students from the No-COIL and COIL groups discussed skills when giving advice. Students from the No-COIL group talked about adaptation, confidence, independence, communication, and overall personal growth. The student from the COIL group covered literacy and reflective exercise skills. Figure 15b covers the scale of students who said their experiences are valuable overall. No students from the three courses commented that these experiences were not beneficial or somewhat helpful. The majority of the students from all three courses said that this experience was valuable. Two students from the No-COIL and COIL+ groups thought this experience was very valuable.

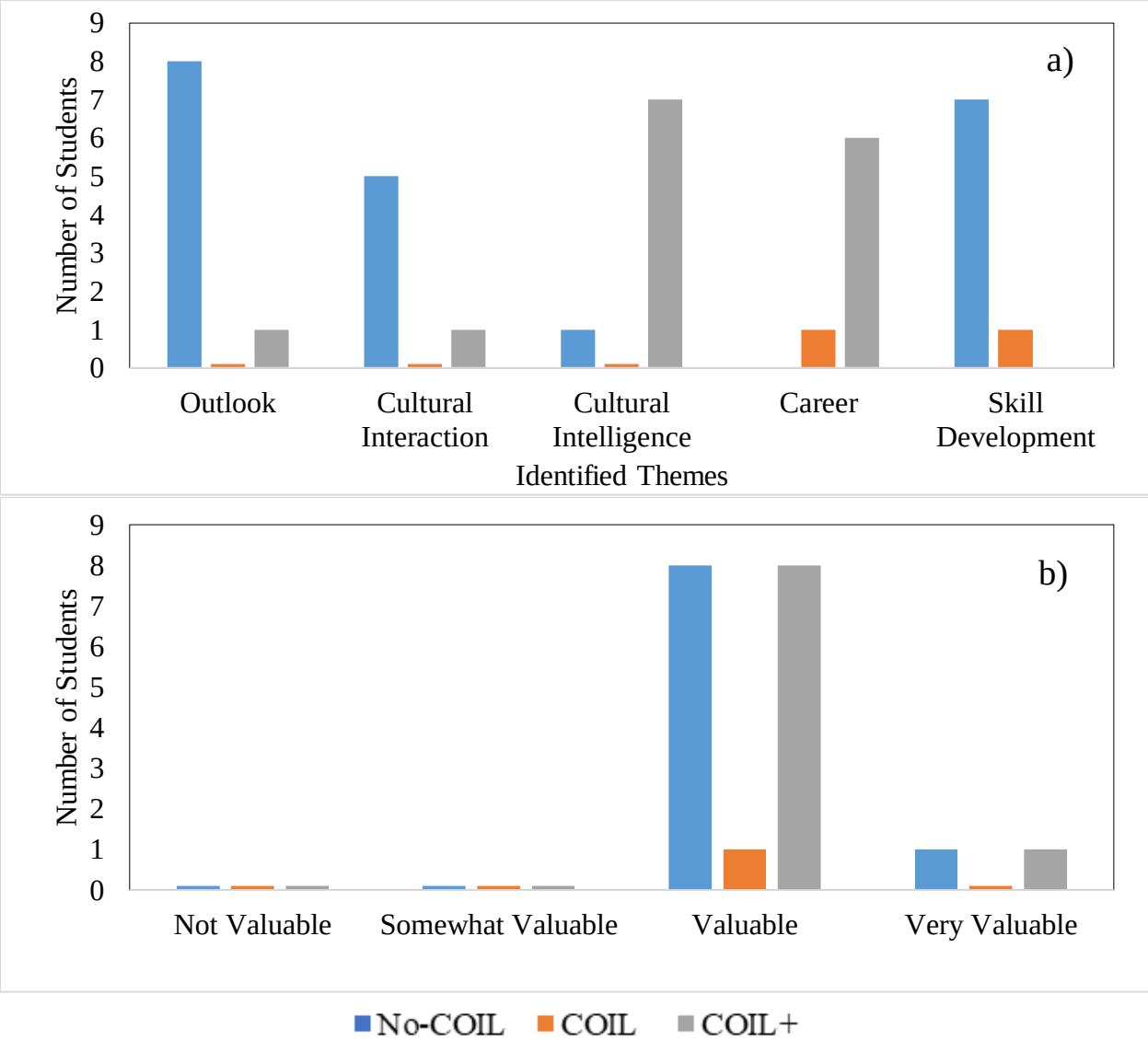

Figure 15. Advice to Other Students: 15a. Themes Based on Students Answers, 15b. Scale of Experience

4. Discussion

This study evaluated several types of No-COIL, COIL, and COIL+ short-term faculty-led programs by assessing the students' responses during focus group discussions. The results, presented in alphabetic order by theme, highlight variations in learning experiences among each program, stemming from differences in the course curriculums.

Wider Global Context Changes Analysis

For the first question, students from the No-COIL experience gained more insight into travel, family orientations, and self-awareness. Meanwhile, COIL and COIL+ talked more about their careers and professionalism. The global start-ups and technical and service projects the students

conduct can explain the differences between the COIL(+) and No-COIL groups. Both the No-COIL and COIL+ groups discussed the cultural and community differences. These comments can be credited since both groups have short-term study abroad experiences.

Fresh Perspectives on the World Analysis

Question two covers the outlook changes among the students. Students from the No-COIL and COIL+ groups spoke about their connection to the people and culture. Again, this can be accredited since the students of these groups experience international travel. A difference between these groups is that the COIL+ groups contained answers with the word "volunteer" and recognized bias. The COIL student covered consumer interactions. These words can relate to the additional course content and dynamics.

Changes in Cultural Perceptions Analysis

The third question asks about global learning experiences and their observations. Students from all groups noticed a difference between the U.S. and the visiting location. The assumption is that all students witnessed something new through their experiences. The No-COIL students talked more about social bonding and family dynamics. Experiences from each short-term program vary. The No-COIL and COIL+ students spoke about cultural diversities and social interactions. Both groups travel abroad to another country, interacting with new cultures and people from their location. No-COIL and COIL group students discussed recognizing bias and stereotypes for this question. The COIL+ students spoke about interactions with local people and the general culture.

Cultural Intelligence Assessment Application Analysis

In question four, students relate the cultural intelligence assessments done in the COIL(+) classes. The No-COIL group students who did not perform the assessment answered based on general outlook changes with their cultural connections and skill developments. Students from the COIL and COIL+ groups noticed parts of the evaluation while interacting with international students. From the focus group feedback, students from the COIL and COIL+ groups noticed benefits from the initial assessment.

Career Impacts Analysis

From the results of question five, students from the No-COIL and COIL+ groups were open to future travel for their career. We anticipated that students would have a pleasant time during their programs and would express a desire to travel in the future as a result. Both courses also cover the skill development of confidence, adaptability, and communication skills for their careers. More students from the COIL+ group have an ambition to work with diverse cultures in their place of future employment. Students from COIL and COIL+ groups noted that these experiences have either moderately or entirely impacted their careers. Four students from the No-COIL group were still determining if it would affect their future career plans. We can assume that some of these students considered this experience a "vacation," as later illustrated in question eight.

Non-technical Skill Development Analysis

Question six prompted the consideration of various non-technical skills due to these experiences. Students from the No-COIL group viewed the skill of adaptability as an outcome of their travels more than the other two groups. All three courses noticed a rise in their communication skills. The No-COIL and COIL+ groups portrayed confidence, problem-solving, and collaboration as developed skills. As a result of traveling, the two traveling categories talked about all the skills listed. Since the COIL student did not have a travel component, their communication skills matured. This observation is logical because the COIL group exclusively addressed international interactions within a global classroom or start-up environment and lacked a travel component.

Key Themes from Student Experiences Analysis

For question seven, students could discuss specific interactions or memories from their in country short-term programs. Students from the COIL+ group spoke about outlook changes and specific memories geared toward community and cultural interactions when compared to the other groups. Some No-COIL students provided commentary on comparable elements, with a predominant focus on particular locations and scenes. Both the No-COIL and COIL+ groups had students comment on career applications additionally. Each group covered specific skills developed from their experiences. The No-COIL students commented on relaxation and living in the moment. The COIL student commented on leadership and helping others. For the COIL+, the students talked about respect, confidence, and communication. Students from the COIL and COIL+ programs view their outcomes more professionally.

Advice to Other Students Analysis

The final question that the students were asked involved advice to other students. Most No-COIL students covered general outlook changes, cultural interactions, and skill development. As previously discussed, their outlook changes involved the word “Vacation”. Other students talked about how being uncomfortable in a new place strengthens you. The students from this group also spoke about the languages they encountered. This note contrasts with the COIL student who spoke about career aspirations and skills developed from this experience. The COIL+ students noted they started to understand cultural differences. This observation may be from the interaction between travel and their CQ assessment. Students from this group also talked about career applications.

Observed Differences Between Courses

Based on the preceding points, students from the No-COIL groups are more likely to think of their experiences as valuable to changing general outlooks, interacting with unfamiliar cultures and people, having moderate career impacts, and being useful for skill development. At the same time, students from this group may also view their in-country program as time to relax and be on a “vacation”. COIL students seem to view this experience as learning about international economies since they worked with global start-ups in their course. They developed skills similar to those of students in the COIL+ cohorts but have a unique experience since no travel component exists. COIL+ students contain a mixture of both previously mentioned groups. Students see development in general outlooks, cultural interactions, cultural intelligence, and skill development. Students from this group focus more on the career outcomes and the impact they create for their futures.

Additionally, the students focus on understanding a deeper level of cultural differences, similar to those described by Naicker et al. [10].

5. Limitations

Several limitations affect these findings. One student's responses formed the basis for the results due to the limited number of student participants from the COIL course. A limitation of focus groups is that not all participating students commented on each question. The structure of the focus group questions may have constrained participants' ability to provide personalized responses, as each prior response could have influenced or shaped the succeeding ones. Another limitation was the amount of time between when the students participated in the course or travel component and when they participated in a focus group. Additionally, all students participating in the focus group were assumed to have had positive experiences throughout their programs. A more diverse group of student participants would be necessary to draw conclusions based on gender or any other demographic information.

6. Conclusions & Future Work

This analysis aims to evaluate the student experience differences between the No-COIL, COIL, and COIL+ classes. Students from the No-COIL group gain valuable insight and skill development on international operations and cultures. Students from the COIL group do not have a short-term faculty-led study abroad program but gain a perception of consumer interactions, career impacts, skill development, cultural observations, and self-awareness. The COIL+ group, containing additional projects, obtained a mixture of the No-COIL and COIL responses. These students achieve knowledge of international operations, experiencing distinct cultures, career impacts, skill development, cultural observations, and self-awareness. Findings from this work indicate positive implications from the COIL and COIL+ initiatives; however, future research must obtain a larger sample size to validate the findings. As No-COIL, COIL, and COIL+ programs can be applied to various engineering disciplines and general education courses, further research may provide insight into the differences among majors and classes. Through these programs, we are able to expand our students' ability to be global engineers. COIL and COIL+ participants make deeper connections to the worldwide community, fostering cross-cultural understanding and collaboration in academic and professional contexts. Ongoing implementation will allow us to build a more robust sample size to improve our ability to understand the differences between No-COIL, COIL, and COIL+ programs.

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