



HSI STEM Grant Program

Attract, Inspire, Mentor and Support Students (AIMS²) Focus Group Study 2019 Report

Prepared for
California State University, Northridge's (CSUN)
College of Engineering and Computer Science

CSUN

COLLEGE OF
**ENGINEERING AND
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College of Engineering and Computer Science
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Overview

This report summarizes the findings of three focus groups that we conducted at California State University, Northridge (CSUN), College of the Canyons (COC), and Moorpark College (MC) associated with the evaluation of the AIMS² project. The focus groups consisted of students who are currently in the AIMS² program. The goal of this report is to explore how student-faculty and peer-peer interaction influence research skill and career development and how family and peers shape academic and social experiences of project participants. This report includes the following sections: 1) Research Purpose and Questions; 2) Research Design and Methods; 3) Results; 4) Summary of Results; 5) Discussion of Results; and lastly, 6) Recommendations for the AIMS² Program.

Research Purpose and Questions

The purpose of this focus group study is to explore AIMS² student participant experiences. Specifically, this study supports one of the broader AIMS² project evaluation study's purposes, which examines the relationship between participation in peer and faculty mentoring and research participation and baccalaureate program completion and career and research skill development among Latinx and low-income first-time community college and university student and community college transfer students in engineering and computer science fields at California State University, Northridge (CSUN). The broader AIMS² project evaluation study's research questions inform the development of research questions that guide this qualitative case study, including:

1. How does student-faculty and peer-peer interaction influence research skill and career development of Latinx and low-income first-time community college and university student and community college transfer students in engineering and computer science fields?

2. How do family and peers shape the academic and social experiences of Latinx and low-income first-time community college and university student and community college transfer students in engineering and computer science fields?

Research Design and Methods

Research Design

With a broader case study design of the AIMS² evaluation research study, we used a qualitative approach to facilitate focus groups. We selected a case study design for this study to explore the AIMS² program in-depth from the perspective of the undergraduate students who participate in the program. Although case studies are often thought of as a study with a sample size of one, this, in fact, describes only a *type* of case study. A case study is better defined as “an in-depth description and analysis of a bounded system,” which can be a person, program, group, community, specific policy, or an institution (Merriam, 2009, p. 40). Case studies are intended to glean information about a larger phenomenon. We studied AIMS² in order to uncover the significant processes that that were illustrative of student support programs for underrepresented students in STEM, i.e., the phenomenon. In order to do so, we drew a sample from the population of students enlisted in the program.

Data Sources and Sample

To select participants for the study, we used a mixed sampling strategy, including criterion and network sampling approach. Criterion sampling strategy requires for a set of specific criteria to be met for participants to be eligible for the study. With the criterion sampling strategy, we set the specific criteria that the participants had to meet in order to be included in the study. For instance, students were eligible for the study if they were at least 18 years of age or older and participate in the AIMS² program. For the network sampling approach, it requires a collaboration with a colleague to recruit potential research participants. We reached out to a faculty mentor from three institutions that partner in the AIMS² project: College of the Canyons (COC), Moorpark College (MC), and CSUN. Given

supervisory and mentoring roles of faculty mentors at each institution, who were assigned a small number of AIMS² student participants in their respective faculty mentoring or research group, we worked directly with faculty mentors to identify and recruit research participants. Specifically, the faculty mentors contacted their students via email to participate in a small focus group study. Seven participants participated in the COC focus group, and six students participated in the MC focus group. Finally, three AIMS² student participants elected to participate in the CSUN focus group, for a total number of participants of 16 participants.

Of the final sample of 16 study participants, 11 (69 percent) were male and 5 (31 percent) were female. In terms of undergraduate major, 5 (31 percent) were in mechanical engineering, 3 (19 percent) in computer science, 3 (19 percent) in electrical engineering, 2 (13 percent) in civil engineering, 1 (6 percent) in manufacturing systems engineering and management, 1 (6 percent) in biomedical engineering, and 1 (6 percent) in environmental engineering. In terms of ethnicity, 10 (63% percent) were Hispanic, 2 (13 percent) Caucasian, 1 (6 percent) African American, 1 (6 percent) Armenian, 1 (6 percent) Egyptian, and 1 (6 percent) Middle Eastern.

Data Collection Instruments and Procedures

We facilitated three 60-90-minute focus groups in total during the 2016-2017 and 2017-18 academic years. We facilitated two focus groups at community college partner sites in Spring 2017 and Spring 2018: MC and COC. In addition, we hosted one focus group at CSUN in Spring 2018. The three data collection instruments for this study included a participant list, informed consent form, and a focus group interview protocol. A focus group protocol (see Appendix A) which is an interview guide that included a brief description of the study, a confidentiality statement, and the interview questions was used in all three focus groups. We designed the focus group protocol to evaluate the study's two research questions. The research questions are specifically focused in two major categories: 1) AIMS² program and 2) Community Cultural Wealth and Funds of Knowledge.

On the day of the focus group, the participants were invited to sign in using the participant list (see Appendix B), which included their name, major, gender, ethnicity, their initials, and a category that asked if they were a first-time freshman in the program. This form served to provide more information about their background for data sources and data analysis. After signing in, the participants were given an informed consent form to sign before partaking in the focus group study. The consent form included the purpose of the study, a description of the required involvement, and the rights of the participant.

In all three focus groups, the participants all consented to be audio-recorded. We used two American Sign Language (ASL) interpreters to voice for the focus group facilitator and to interpret the participant's responses in ASL as the focus group facilitator is Deaf. The focus group participants took part in an interactive conversation to discuss about their experience in the AIMS² program and as well as their cultural background. Students who participated in the CSUN focus group received five dollars in Matamoney as an incentive to participate. After the focus group sessions, the participants were given a coded number to protect their confidentiality. All the participant lists and signed consent forms that could identify the participants were kept in a locked file-cabinet.

Data Analysis Procedures

After the focus group interviews, we transcribed the digital audio-recordings using a naturalized approach. Then, we uploaded transcribed interview files to cloud storage, where they could be accessed and loaded into a qualitative data analysis software program, ATLAS.ti, to segment and code text. In an attempt to increase reliability, two researchers participated in the analysis. We performed a preliminary exploratory analysis to explore all of the data to get a sense of the data as a whole before analyzing into parts. First, the interviews were compared with each other to note the similarities and differences. After getting the feel of the data, we began the coding process by segmenting and labeling the data to develop broad themes. This inter-rater strategy, termed "multiple coding", encourages researchers to face competing explanations and to generate insights about the data at hand (Barbour,

2001). After coding, we reduced the list of all the codes to six main themes that led to the formation of conclusions from the data.

Results

We present results of data analysis of the three AIMS² focus groups below. The following themes emerged during data analysis: 1) college transition as adapting to campus communities; 2) meaningful interaction—and outcomes—among faculty and peers; 3) preparing for careers and overcoming barriers; 4) feeling welcome in the program and the pressure for female students to succeed; 5) resiliency and achievement of academic goals; and lastly, 6) navigating through college with the support from their family.

Transitioning to College as a Process of Adapting to Campus Communities

Transitioning to college can be difficult for students. Campus climates may not be welcoming to students especially when they are different from what students are used to, which requires effort from students to adapt to the new environment. The focus group participants all shared their experiences in adapting to the collegiate environment.

“I just have to adapt”: Students new to campus, new to college. For some students, adapting to a college campus environment seemed to be a challenge. One participant who was a “pretty good kid in high school” and got “some good grades” struggled with the transition from high school to college commented when “all of a sudden realizing kids aren’t looking up to me or ahead of me looking down on me and that was a big motivation too to uh do this.” Another participant who “felt it was kind of difficult to adapt to college life” added that “with sports and just really finding the direction I wanted to take it made it a lot more fun and it’s a beautiful campus so it makes it easier.”

Motivation and figuring out their major appeared to shape student experiences in adapting to the college setting for some participants in this study. However, a participant who has been in the AIMS² program for two years has learned that it does not matter who the professor is, “if somebody

wants to learn, they can go and learn.” In this participant’s case, he has learned not to rely on professors to learn everything in order to get good grades:

College students have this mentality that professor is the one who has to teach everything and if the professor is bad, and if they fail they blame it on the professor. But the research has taught me that it doesn’t matter what or who the professor is. If somebody wants to learn, they can go and learn, regardless of, yeah, you get the, get the good grades.

From this participant’s experience, part of the process of adapting to the college setting is not to solely rely on the professors to excel in college.

For some focus group participants, classroom environments appeared to shape their ability to focus during class. One focus group participant, who is a transfer student, shared that students in the community college classroom differ significantly from students at universities:

... I used to go to a community college before, and they wouldn’t be focused at all like in class. They would just be like falling asleep and stuff and here at the university, ... you see that people are more focused and wanting to learn.... I feel like it just helps me stay more focused in wanting to finish school. ... I think going to junior college first helped a lot with ... education in general. And then ... coming to the university after really helped me like stay focused.

For this transfer student, who is a senior in his last semester, being with others who are focused academically and motivated seemed to help him to stay focused in order to obtain his degree. Along with adapting to the collegiate environment, it also appears that the participants have developed the skill to be able to adapt with people from various backgrounds and education.

“I’m very conscious of how I interact with people”: A developing awareness of group membership on a new campus. In a new college campus environment, some focus group participants acknowledged that they seemed to have a greater awareness of from their interactions with whom faculty and peers on campus as one part of their student lives and folks with whom they work outside of

class/off campus. This awareness seemed to form in relation to academic training and educational background. To this point, two focus group participants commented on how their co-workers have lower levels of formal education, "...here I have people who are of similar intellectual level while in my workspace, I work with people who barely have any education." Another participant said, "...conversations with people outside of class with people vs. at work, is completely different just because the amount of education each individual has is completely different."

It appears that the focus group participants learned to be conscious of how to interact with people from various educational backgrounds. One focus group participant believes that no matter the difference in educational backgrounds, one can still learn from others. To this point, he shared:

I believe that you can learn something from everyone you connect with whether its negative or positive and ... just learning about people in general is a key concept I think to being an engineer and keep staying um genuine and letting people see who you are would um would be ideal and that's ... what I do.

However, even though with this level of awareness and knowing how to collaborate or work with certain people, there is a sense of comfort with being people who share similar views. For example, one participant commented, "I constantly find myself adapting to every environment that I'm put in" and "I'm very conscious of how I interact with people and um I also tend to stick to the people ... that do share the same interests as me just cause it is easier..." These focus group participants seemed to be aware of such differences and adapt to certain environments with the exception of one participant, "...I would have to say I pretty much act the same everywhere." With the exception of one participant, it appears that some participants have developed the ability to be able to adapt to people of various educational backgrounds and some of these participants have families who do not understand their major.

“They don’t understand engineering cause I’m a first-generation student”: Navigating campus with parents who are foreign-born and/or never attended college. During the focus groups, a few participants shared their experiences of being first-generation college students who are the first in their family to go to college. Two participants expressed support from their parents, but these participants also shared stories about how their parents did not seem to understand their majors or what programs they were involved in. One focus group participant mentioned how his parents

...know[s] that I’m studying, they support education. They don’t understand engineering cause I’m a first uh generation college student. Um, they don’t know that I’m a part of AIMS²...they are not sure what I do in my day to day, but they know that I’m doing something and they support the idea. But ya it’s a very um vague to them.

Another focus group participant also mentioned a lack of knowledge of their participation in the AIMS² program,

...my mom doesn’t have a great education. So she knows that I’m going to college, she knows that I’m trying my hardest, she knows that I’m putting a lot of time into it. She doesn’t know that I’m in the AIMS² program but uh she definitely knows that I want to be an engineer so she tries to be there as much as she can.

Regardless of what their parents know and do not know about their college education, these participants made clear that they have their parent’s support. Not only do they have the support of their parents, AIMS² students participating in focus groups described a strong support network from their faculty mentors and peers in the program, which we consider next.

Faculty and Peer Interaction within the AIMS² Program

Students participating in the AIMS² program who shared stories in the focus groups described a support system from both their faculty mentors and their peers. It appears that the faculty mentors play a meaningful role—a significant part—in the what participants framed as their success as students.

Faculty mentors seem to serve as a source of support in their education and building their resume with work-related skills that they need as engineers. Further, we observed a pattern where peers seemed to offer support in the forms of advice-giving/receiving and help on projects. We explored the specific forms of support from the faculty mentors and peers that contribute to academic success.

“If it wasn’t for the faculty members we wouldn’t be where we are”: Navigating through their major with the support of faculty mentors. As a general AIMS² program practice, participants are assigned a faculty mentor who helps them succeed in their major. The faculty mentors meet individually and as a group with mentees. For individual meetings with each participant, work tends to focus on discussing class schedules for registration and checking their progress in classes they are currently taking. For example, one focus group participant explained:

In the individual meetings he goes over the classes, uh, he goes over the grades that we’re getting, and he helps us choose the next classes and also finds a way to improve, like to help us improve our grade, whether it’s going to tutoring or whatever the case is...

Here, checking in on each participant seems to have a motivating factor, as one participant mentioned that “he always wants to check up on us on what we are doing or how our classes are going. So that, that pushes me to do better.”

The participants seem to be appreciative of the support that they receive from their faculty mentors. In fact, one participant mentioned that his faculty mentor is “willing to go the extra mile to help” and is “always there I’ve needed help.” In some instances, if participants cannot make it to office hours, their faculty mentor sends “emails that, if we cannot make it to his office hours or meetings, we [can] set up individual appointments to meet with him.” It seems here that the faculty mentors set aside extra time to meet with their students and provides support when students need it.

Along with offering support, focus group participants noted that faculty mentors also work closely with the participants to ensure they are receiving tutoring or receiving support from classmates.

For example, a participant said, “he’ll give us advice on what to do, like going to tutors and talking to other students and stuff that, at that same course. He’s really helped a lot.” Moreover, another participant added that his faculty mentor went out of his way to search for a tutor for him:

this one last semester I was struggling in a class, and we have tutors that provide tutoring for us, and they didn’t have a tutor for that specific class, and he went out and searched for a tutor just for that class for me. So that’s something.

Overall, faculty mentors seem to serve in a go-to support role for mentees. A focus group participant mentioned that “I feel like it’s someone that we can go talk to if anything ever happens.” What does this role mean for participants? One participant said it succinctly, offering the following: “if it wasn’t for the faculty members we wouldn’t be where we are. And they, they show the most support for us.”

***“I was able to cut down a whole year”:* Accelerating education through the assistance from faculty mentors.** In their mentoring roles, a couple of focus group participants noted that faculty mentors help participants figure out and plan their course schedules. One particular participant mentioned how his faculty mentor assisted him in graduating a year earlier than expected with his help:

Uh, usually computer science people graduate within three years when they transfer here. But, because of my mentor, which is part of this program, uh, and I was able to cut down a whole year. So, I’m graduating in two years instead of three years... Uh, as I said, he’s the reason I’m graduating one year earlier. So, I, I think one of the major reasons I’m succeeding is because of him.

As you can see from this one story, faculty mentors appear to meaningfully assist students with selecting the right classes to ensure timely graduation. Another participant agreed, “I feel that it’s ... accelerating my education.” Here, a clear pattern emerges that points to connections between faculty mentoring and participants’ undergraduate education.

“We’re trying to publish a paper”: Faculty mentors working with students on research

projects. As a key program component, faculty mentors work with students on research projects. One participant in particular has been working with his faculty mentor on a research project and they are aiming to publish a paper:

Uh, there has been projects that me and him worked on it together. Uh, we were actually sitting side by side and he was helping me of course, he has a lot of knowledge. Uh, he helped me, and together we finished the project and we’re trying to publish a paper about it right now, so... I feel really good now because very few people [with a] bachelor’s degree publish a paper, and that’s something that I’ll always remember.

This is indeed an achievement for an undergraduate student, and it would have not been possible without the support from his faculty mentor. It also seems that students benefit from the support of their faculty mentors as well as their peers.

Another participant commented how her research work with faculty is helping prepare students for their careers: “the research program, I think, is preparing us for [our] career...[my mentor] assigns different side projects...that has to do with my major that they do out there.” What we see here is that participant research with faculty presents an opportunity to gain experience in what engineers do in the workplace. A participant explained how he is gaining experience with coding: “the big impact that it’s made on me is the fact that this is my first job where I’m actually coding, like, mostly every day... looking at code every day is gonna make you better at it.” Students appear to be benefitting from working with their faculty mentors with research projects—and interacting with their peers in research contexts.

“I believe it has made a stronger community for engineering students”: Benefiting from establishing relationships with AIMS² peers. It appears that students in the AIMS² program benefit from interacting with other AIMS² students and promotes students to make connections with others. For example, one participant mentioned how being involved in the AIMS² program provides:

a good way to uh make connections with people with similar interests cause although a lot of the kids in my classes are also studying engineering I, I don't talk to people that much. This gets you more talking to people.

Another participant added that the way the program is designed, it gets the participants talking with each other: “[The AIMS² program] put hard working, motivated, driven, and like-minded people in one room... [and] ideas would fly across the room and we learned a lot from one another.” It appears that the program facilitates student-student interaction in a peer learning sort of context.

By promoting peer-peer interaction, one participant observed a “stronger community for engineering students” that seems to have an impact on one participant in order to help others. Indeed, this participant continued: “it has also pushed me towards um helping other students as much as I can with what I've learned.” With a strong sense of community appears to promote the feeling to help others. This behavior seemed to also be encouraged by faculty mentors. For instance, one participant said, “...my old faculty mentor...he always tells me that I have to pay it forward...the new incoming freshmen...he tells me...you can give them tips, or guide them somehow.”

A few participants mentioned that working with others has helped them achieve academically and at a faster pace than if they did it on their own. On this note, one participant commented that “having to work with a person it actually helps you to grow in a way faster than doing it on your own.” Another participant added:

I always try ... to study [on] my own ... but since I joined um this group, it actually has helped me more because when I was trying to do it myself, it would take me longer ... Now that I'm here, I can actually do it much faster.

Working with other students appears to facilitate a more efficient approach for focus group participants. Plus, seeing other students working on their research seems to motivate the focus group participants with their research projects. One participant mentioned that “seeing them do their research projects

and stuff really influences ... everyone else to do research.” A strong sense of community among students seems to promote teamwork and provide students with motivation to complete their research projects. One participant added, “And you just [help] each other...You’re just trying to...make connections and make everyone in this program just...be the best they can be.” Here, participants appear to genuinely care about each other and help each other out.

“Let me know if you need any help”: Navigating through coursework with the advice from AIMS² peers. Focus group participants commented that they have received advice and support from their AIMS² peers. When discussing future research projects, one participant mentioned, “they will also give us information on how to do our research if we were to do one.” This pattern appears to be helpful to participants, especially to ones who may be less inclined to engage socially with peers. For example, one participant commented, “I’m not a social butterfly...now I’m able to communicate a little better with people who are trying to get um from other classes.” It seems with students supporting each other builds a stronger community and helps the shyer students communicate better with others. This particular participant also added that he was able to help a friend, a transfer student majoring in engineering, “I would recommend doing this, doing that, so you get more information, you might be able to like see what you like better, and he sort of like opened up to the idea that there’s more out there than just one type of engineering.” This particular student appears to be blossoming in the AIMS² program and is sharing concepts, models, theories, etc. with other students that he has learned from his AIMS² peers.

A mixed bag: A collaborative and competitive peer environment from the viewpoint of AIMS² students. Overall, focus group participants seemed split on how collaborative or competitive the peer environment in engineering and computer science fields are. On the one hand, a couple participants commented that the peer environment is more collaborative than competitive one. One participant mentioned that “we are definitely not competing. Uh, we are working together. And if, if we don’t work

together then we're not gonna be able to finish what we're supposed to finish." Another participant also remarked that the environment is "collaborative which makes it nice." While these two participants shared a more collaborative experience with peers, one participant offered an alternative perspective:

You always have to try to uh prove not the professor per se but your classmates wrong. Or you gotta kind of like try to be better than them just because the profession that we are trying to uh obtain is a very competitive one and even though we are trying to achieve kind of the same thing...you're not gonna put me down and like work harder and harder and work smarter and work faster ... So I think that's one of the things that makes us excel at what we're doing...

Clearly, this participant perceived a more competitive peer environment. Specifically, working "harder," "smarter," and "faster" to prove your classmates' wrong tends to fall along the lines of a more competitive environment, rather than a collaborative one. As a bit of a counter-narrative, framing competition in a constructive way, one participant mentioned how "it's important to have competition" because "to see other people trying harder because then you're like oh, I have to get my game up" and "it kind of pushes you to...excel." Competition, for this participant, appears to increase one's motivation to succeed. In order help students succeed, the AIMS² program helps students prepare for careers.

Overcoming Barriers and How AIMS² Assists Students with Career Preparation for Success

The focus group participants reported overcoming barriers to be where they are as students today; however, they noted that they will likely encounter more barriers in their journey to become engineers. It appears that most of the participants have a positive outlook on their future. Part of the general AIMS² program components include working in internships at local engineering companies and opportunities to participate in hands-on projects and research with their faculty mentors. One of the main goals of AIMS² is to prepare students for a career in engineering and give them the tools to overcome potential barriers in achieving their career goal.

“I wanna work in big tech companies...”: AIMS² students discuss their career goals. Some focus group participants discussed their future career goals. One wants to start up his own company: “I would like to start up my own software-based company or hardware company with my brother.” Two participants, in particular, expressed an interest in working for large engineering/technology firms. To this point, one commented, “I wanna work in big tech companies like Google, Microsoft, Amazon” and the other participant mentioned, “I would actually like to work for Disney. Um, I want to be an Imagineer.”

Beyond size and type of company, one participant shared that helping others is an important career consideration. She would like to work in this field by teaching, as she describes here: “Maybe work a little bit in industry, particularly systems engineering, um, and also, you know, teach, teach at a community college.” For another participant, having a balance between work and family life is important as he mentioned that he does “want to have that balance of being able to go to work but then coming back to a family. Further, some focus group participants articulated a clear path of where they want to go whereas others have yet begun their research. One first-year focus group participant commented, “I haven’t done much research on like the different kinds [of careers] there are.”

“So that’s why I chose my major”: *How participants selected their majors.* A few focus group participants commented on their choice of majors because of their fascination in a certain area as a child. Here, one shared, “ever since I was small...electricity has always fascinated me.” Another mentioned that he chose computer science because “since I was a child I was fascinated with computers.” However, for a certain participant he “looked at a light bulb and was like whoa gotta learn how that works” and decided to major in electrical engineering.

Finding an interest appears to drive participants to focus their major field of study around the area of interest. For one participant, he loves “structures of the buildings and how they were created” but he’s “not an artistic guy.” However, he applied his skill of problem solving and is into “the

engineering aspect of the structures themselves.” He worked around his love for architecture to where he excels in and combined it with engineering.

For a couple participants, it is a class in high school where they found their interest. One day, one of the participants was in her biology class and they talked “about tissue engineer and how the stem cells can create a whole arm or like create a whole kidney just by using the cells” and she mentioned “that’s kind of like [a] tissue engineer or bioengineer so that’s how I decided.” For another participant, it was not as easy. He had to explore various subjects to find that spark, sharing:

I was a horrible student in high school. I didn’t want a degree. I was defiant. I didn’t like rules, I didn’t like anything. Um, but then once I got into college, um, my biggest fear was, uh, getting a degree and then getting a job that I didn’t like. So the first year I kind of just played around. I took welding classes, business classes, design, and then I finally, I started getting into technology. So then I decided to take computer science courses. And then that’s kind of like the only thing that, like, turned my brain on. I was motivated to like read a book for three hours, I was motivated to sit til four a.m. coding, I was, that’s the only thing that really motivated me to do academics. So that’s why I chose my major.

It appears that the initial interest to major in engineering varies among the participants. Some participants knew their career path as a child whereas for some, it was much later in life when they figured out their major.

Barriers in achieving career goals. The focus group participants all shared various barriers, or challenges, in pursuing and achieving their career goals. Race/ethnicity is one barrier, as one participant mentioned that “my nationality might be a trouble because I’m not American and I’m Mexican.” For another participant, she perceived both race and gender to be potential barriers in her goal of being an engineer. She commented that “probably being a woman could be ... difficult sometimes” and “just being Latina.”

A couple participants shared different barriers and were concerned about having the best connections to get their first job. For example, one participant shared how:

there's always the barrier of not knowing the right people, or, not you know, not getting an opportunity because there's you know, a group of people that already know each other. They've already made this network, and ... you just kind of [sit] there like well I'm not gonna get this job. That's I think the biggest barrier for me.

A participant from the same focus group agreed by stating: "definitely...connections with other professional engineers" is a barrier but also mentioned how "financial income...probably would be the biggest thing." Another participant added, "For me, I think I'd be money as well. Money is a big barrier." Financial resources seem to be a barrier for some participants in terms of paying for their college/university fees and related educational expenses. For instance, one participant explained how money is a barrier, "...cause if I can't pay for my classes I'll have to go work to pay for my classes, and then if I have work I can't really study, have enough time to study for my classes." Another participant explained how he had to take a gap year to work and save money for college and how it impacted him:

...you have a gap year, so you've lost all the knowledge that you've cultivated in that previous year, previous semesters. And then because you were forced to work. So sometimes it's a you thing where you go man, I really wish I hadn't, but I had to because I needed money, I needed wages, I needed to go into almost a survival mode, I need my basic needs, my basic resources.

It appears that money and/or financial resources is a shared concern among focus group participants with achieving their career goals and all have their own barriers to overcome in order to succeed in college.

"Everyone has their own road": Students overcoming barriers to achieve their career goals.

While several focus group participants identified barriers to career goals, they all felt that they succeeded in developing a skill set to overcome career challenges. To overcome barriers in achieving

career goals, one participant commented that “being resilient. Just learning how to adapt well, changing habits, learning how to change your habits quickly... that’s one big talent that everyone needs to have.”

One form of resiliency for focus group participants appears to be grounded in a generally positive outlook on career and life. Here, one participant mentioned how “you kind of have to learn to admire the process” and that “you’re probably going to have days where you just want to go home and cry or have a bucket of ice cream.” Another participant chimed in how “some people might like just shut you out” but you have to “move on.” Having a positive attitude about overcoming challenges that arise in their lives seems to resonate strongly among most, if not all, focus group participants and may have an impact on their outlook on their future goals.

***“I just go for it”:* Students’ outlook on future goals.** Indeed, focus group participants all appear to have a drive or motivation to achieve their goals. For example, one participant commented, “I believe I got the brains and the ... will to do it so that’s the main thing.” Having the will to succeed is important, but for some, having the experience of overcoming the odds helps prepare one for the future. A focus group participant made a statement:

I feel like life prepared me for life... You know I’ve been through worse so you know it’s just one of those things that you’re going to overcome just like you thought you couldn’t overcome this past as well ... Just certain things in life I guess that you go through prepares you for future and for the careers and ... other things that will come down the road.

It seems that life experience related to overcoming obstacles while obtaining a college degree supports these participants in achieving their goals. For instance, a participant said, “Honestly, I feel like all the obstacles are happening at the university. And if you accomplish this than I don’t think anything can stop us.” One other participant added that the engineering field is “cutthroat” but the AIMS² program is “very supportive.” Another participant commented that the AIMS² program “has given us ... certain uh tools ... [that] we need for the work environment.” Such “tools” include information about careers, how

the industry works, developing resumes, and learning how to work in teams. By having a “supportive” environment and giving students “tools” may help them overcome obstacles/challenges in college and have an optimistic outlook on their future academic/career goals.

“AIMS² definitely has helped me to prepare to go out into the workforce”: Students receiving information about majors and careers. Focus group participants noted that the AIMS² program offers them information about engineering majors that seemed to help establish a plan for their undergraduate academic program work. For example, one participant said, “It really helped me set a plan um like a clear plan of how ... my journey as an undergraduate engineer would be or where it would go...” Another added, “it’s also kind of guiding me to understanding more proficiently in my major.” However, not all participants know exactly what they want to do, and it appears that AIMS² helps them figure it out as one participant said, “I’m still um finding out what I want to work in and this program is like helping me figure out what do I want to do after.”

Not only do AIMS² program components inform of what students need to do to complete their degree programs and help them navigate their major, focus group participants also shared that they learned about engineering fields more generally. For instance, one participant commented, “it teaches you how what you’re gonna do afterwards, so it just tells you how the path is going to be in the future so you can make your best decision.” By knowing “how the industry works” has made a participant “ready to go out there and not be afraid to achieve what I need to achieve.” By providing information and guidance, AIMS² seems to assist participants to be prepared for life after graduation.

A few notes on AIMS² workshops: “a lot of benefits” and one area of improvement. As part of program activities, AIMS² hosts panels, workshops, field trips, and research projects. It appears that focus group participants have benefited from these events and projects. One participant spoke highly of these program activities:

...everything has been good, yeah, we, we've been to conferences, uh, they brought people from the industry to talk to us, we've been to resume workshops. So, there's a lot of benefits. And there's, I don't see any downsides.

One participant mentioned that the "most important" workshop was "the resume workshop," and apparently his resume is now an "eye catcher." On top of workshops, a couple of participants commented on how a field trip to JPL gave an "out of classroom experience" and how that promoted them to learn about "different disciplines and different fields."

However, there were some comments about a panel workshop and how the panel did not incorporate enough women for the female participants. For instance, one mentioned:

I would have loved to have seen alumni panel come from AIMS² being women... at least validate to me that yeah, they're doing it, and I can do it as well because we do have downs, we are very emotional, and we need that support system. And we need to see more women in the panel.

Another female participant agreed: "I feel the same way about having women in the panel, mainly because as we all know it's not as common to have women in the field."

"It has taught me so much about the future": Benefits of faculty research tied to careers. A number of focus group participants commented on the career-related benefits, including non-cognitive skills important for professional growth and development, associated with faculty research. Here, one participant mentioned how it is "preparing" them for their career and added how it makes them "learn how to work in groups, and as well as working individually, and to do the research on your own." It appears that the participants benefit from learning how to work in a team. Additionally, another participant commented, "it also taught me that we have to work as a team in order to figure out problems, and not just individuals the whole time." Within faculty research, one participant mentioned that the faculty mentor with whom he is working "assigns different side projects...that has to do with my major" and that he feels "he's just getting me to think about code in a different way." Clearly, faculty

research with participants appears to be pushing them to learn how to work as a team, conduct research, and to apply their knowledge in order to prepare for their career as engineers.

“Using the AIMS² program as a way to get access to opportunity” by making connections with people. A few focus group participants discussed how they have made connections with people through the AIMS² program. One participant mentioned how her faculty mentor has “introduced us to many speakers” and how she feels “more welcome into this whole intellectual community.” A shy participant said, “I also saw it as a good way to uh make connections with people with similar interests cause ... I don’t talk to people that much. This gets you more talking to people.” It appears that the AIMS² program promotes a welcome environment for students to thrive.

Program Diversity and the Pressure for Women to Succeed

CSUN’s AIMS² program was established with funding from the U.S. Department of Education with the broad intent to support Latinx and low-income students transfer from community colleges to a four-year university (research site) to complete degrees in engineering and computer science fields. With a diverse group of students, we inquired about the peer environment during the focus group sessions. It appears that participants from various ethnic backgrounds feel welcome; however, there is pressure for women participants to succeed.

“I think we all feel pretty welcome just because we come from different ethnic backgrounds”:
Feeling welcome as underrepresented students in the AIMS² program. The focus group participants appear to feel welcome in the AIMS² program. Here, one participant said, “we’re all different race, and gender, so we get along.” Another participant also commented on the diversity among students in the program, “We’re ... just open because we come from different ethnical [sic] backgrounds.” A participant explained that it is how AIMS² is set up that promotes the feeling of being welcomed:

I think from the get go the way that AIMS was even set up, when the roster said represented backgrounds and multicultural... like they welcomed that diversity uh so it kind of gave us a platform ... to just come in and be comfortable.

An African American participant explained how he feels comfortable in the program, "...being a black male I get... black racial tension from like outside...I don't feel that here. And...to have uh, uh, an environment where it's not, its, it's a relief..." Here, you can see a bit about how focus group participants felt welcome and are able to feel comfortable in the program, but there seems to be pressure toward women and gendered patterns observed by participants.

"You better pass this class because you're the only woman in here": The pressure for women to succeed in STEM fields. A few female participants commented on the pressure to succeed as a woman in engineering. One explained how she took a JAVA class by a female professor and how the professor "came up to me before the final and was like, you better pass this class because you're the only woman in here. You gotta, you gotta do this, for all of us." Another female participant commented, "I found myself being an only woman in these environments um so you know you're definitely you have to set the bar higher." It appears here that there the bar is set higher for female participants to succeed in male-dominated engineering and computer science fields.

With gendered expectations for behavior/outcomes, it seems that female participants sometimes put themselves down. One explained,

I think most of the time it, it's, sometimes it's ourselves just being pushed, putting ourselves down saying oh, I just can't do it, this is not for me, or like, oh it's for men, you know. We've been told so much that, that we end up doing it to ourselves, that oh it's I shouldn't even be in this field, what am I doing, or all that, I don't know.

A male participant also added how he had “friends who are females and they told me in the past that they’ve liked ... [engineering]... but they’ve kind of put themselves down, and it’s like, oh no I can’t do it.”

As a well-documented pattern in the literature, one participant explained how she feels in engineering a male-dominated field: “like as a woman in engineering, we have to almost represent ourselves constantly. We have to stand our ground in terms of the physics, the math, the chemistry, what we know, because otherwise we won’t be valued.” It appears that some of the women participants feel a significant difference with being female and having to stand their ground within the engineering program which is a form of resilience.

Resilience Building in Students: Factors that May Impact Academic Resilience

As most STEM occupations require a minimum of a bachelor’s degree, the fact that historically underrepresented students of color graduate from STEM fields at lower rates in comparison to their peers poses a critical problem. During focus group sessions, we inquired about various factors that can pose an impact on academic resilience. Here, participants discuss feeling underestimated and overcoming these feelings, how they stay motivated and manage stress especially through tough times, and what resources they use to help them succeed in their courses.

“I’ve felt underestimated but I’ve never looked at it as a bad thing”: Overcoming the feeling of being underestimated in order to succeed. Many focus group participants discussed how they felt underestimated and how they overcame it to get where they are now. One participant commented, “I think I’ve always been underestimated just because ... I [didn’t have] the greatest grades ever. But as I got older I realized that just a little bit of hard work and dedication will get you a long way.” Dedication appears to be a form of academic resilience for this participant. For another participant, he mentioned that being underestimated is a “good motivation” and he likes “being underestimated...life’s easier that way.” It appears that some participants use being underestimated as a motivating factor and if you play

your cards right, it can be to your advantage. For instance, one participant uses being underestimated to her advantage:

When you're underestimated you have the opportunity to you know people you don't have the spotlight on you, people don't think you're ... would amount to much so you can actually get into a position where you're in a position to um compete with the other people that you're competing with I guess and I use that I always use that as an advantage ... and it ends up paying off if you play your cards right ...

In a different focus group, another female participant mentioned a similar approach to using being underestimated to her advantage. She commented, "uh I definitely feel like being underestimated is a is a power thing, it's like a super power in a way that um yeah you can definitely play with it and use it to your advantage." It is interesting that from two different focus groups, two female participants appear to use being underestimated as a form of academic resilience as something to "play with" and to use it as an "advantage."

"When I look at a computer...that's where my brain turns on": Finding that source of motivation. For some focus group participants, being underestimated serves as a motivation to succeed. However, there are other sources of motivation. For a few participants, it's the outcome of degree completion and the "financial gains" that facilitates a motivation to succeed. For example, one said, "knowing the fact that I'm gonna start working and making money" is "the motivating factor." In addition, having "an actual career" is the driving force to succeed for one participant. One other participant commented that to "have my own life" and to give "back to my parents" is an important factor to be successful in college.

Three focus group participants narrated stories about how their parents, respectively, gave up everything in their home country and immigrated to the United States. Both participants feel that they

cannot give up on their education due to the sacrifice that their parents made for their education. For instance, one participant commented:

my parents...immigrated here and had absolutely nothing and worked extremely hard so that I can have something and uh yeah I think if I just wasted my own time that would just be on me but if I waste my own time I'd be wasting theirs and I, I can't do that to them.

Another participant from a different focus group mentioned that his parents "gave up everything they had over there" for him to "have a better career here." He said, "Therefore, I need to like return something to you." One female participant explained that her family "had a great life there" and "left everything, came here because of our future...because clearly women don't have any future there." She added, "I just feel obligated...I will be disappointed in myself for not doing it." These few participants appear to feel that they owe it to their parents to finish their education because they moved here for them to succeed and that seems to be an internal source of motivation.

One other participant added a different form of motivation, "all the aspects...financial gains or anything like that, my biggest push is that when I look at a computer...That's where my brain turns on, that's where I'm focused, that's where nothing else matters to me besides that." This participant seemed to know that he will financially gain from obtaining a college degree, but his ultimate factor for success is that he truly loves computers and that love is his motivating factor to succeed.

"I study a lot": Exploring what students do to succeed in their classes. In focus group sessions, participants discussed what they do to succeed in their classes. One participant mentioned her reason for success is, "for me it was...strapping in and investing in every class" and "also taking advantage of all of the resources, that's what brought me closer like the library, and tutoring center, and this program." By having access to resources and knowing where to go appears to be important for the participants. For instance, one community college participant mentioned:

being in community has helped me like to know where to go and what to do later on and if I transfer then I know the first thing I have to look is for counselors... where the library is, what time is it open, I know I have to look if there's[a] tutoring center ... I will look everywhere else and see if those things are there and what are resources that will help me...

This participant appears to know that when he transfers, the first thing he will look for is where he can get resources in order for him to succeed in his classes. However, a participant had a complaint about using the tutoring center at MC: "for one answer you have to wait for like hour-two hours and really not much of a help..."

It appears that the participants know the importance of attending classes and working closely with their instructors. For instance, one participant mentioned, "I attend all my classes as the main thing cuz that's the first thing that will get you out of the game." Another added, "the investment is the... classroom and the teachers that you use to gain knowledge from..." Attending classes and consulting instructors is an important source of success, but one participant relies on the support from his classmates to help him succeed. He mentioned that "finding who's the strongest in the class and leaning on them and getting enough information and continuously just studying day in and day out..." and that "and getting help with people who understand the concept so you don't end up spending day and night trying to read it yourself and [understanding] it" is what helps him succeed in his classes.

Another source of information that focus group participants use is YouTube. Indeed, a participant commented that she took a biology class and her professor told everyone "that if you haven't taken chemistry in the past year or presently, you shouldn't be in this class." She added that it had been "a long time since I had done chemistry", but she was determined to stay in the course and used "YouTube and learning what topics that I [needed] to about chemistry and yeah, I did...finish." Another student mentioned how he uses YouTube, "If a class or course is stressing me with this problem that I'm not understanding I'll go to YouTube and see like some other professor solve it a different way

and stuff and that helps.” This is an example of using online resources such as YouTube to succeed in a class.

“I do something that is not related to whatever is stressing me”: Understanding how students manage their stress. Well documented in the literature, college can be stressful for students at times. The focus group participants do different things to relieve their stress. For a few, exercise and sports appear to be an important stress reliever. For instance, one participant mentioned “When I’m really stressed out, I go like for three hours and just work out as hard as I can.” Another added, “I go and run. I... do sports, so for me it’s a getaway, anytime I’m stressed I’ll just, um, take my time and go run.”

From what focus group participants shared, it appears that there are two approaches that participants take to dealing with stress. The first is to take a break from the stress through exercise or hobbies. The second is to face the stressful situation and deal with it. Some turn to hobbies or do something that is not related to their sources of stress—classes, work, etc. For instance, one mentioned “I play video games and I have a Dungeons and Dragons group, I mean, I pretty much go full nerd.” Another chimed in, “I watch documentaries or whatever I can find on YouTube sometimes.” YouTube appears to offer participants an escape from their stressor. Another participant added, “I just watch YouTube and just find comedy stuff that’ll make you laugh where like you don’t think about it.”

Escaping is what some participants appear to do in order to get through stress; however, for some, it seems facing it head on is what they need to do to get through it. For instance, one participant commented:

I can just kind of throw myself and not worry about anything like a tv show or whatever but uh and it always brings me back to actually taking care of the problem itself. And so when I am stressed, I will sit down and stop everything and figure out what it is that is actually stressing me out and I’ll isolate it and work on it um and I will um try to find a solution and if I can’t I’ll

actually ask myself if there is anything I can do about it and if I can't, then there is no point in worrying about it, but um yeah the first thing I would do is definitely tend to it.

By tending to the stressor itself, another participant also tries to “work it out, like step by step, taking like one thing at a time.” One participant looks at the situation and sees how he would gain from the situation and prays for guidance to get through it. He explained: “I look for the ... learning aspect in a stressful situation, I would sit down and pray about it and just go and ... have patience and see what there is I would gain from being in that situation.”

“Many professors will help you”: Students discuss how instructors are a source of support.

The participants mentioned how their professors have been helpful. One participant said, “[My professor] puts so much effort in each and pays so much attention to each student that it just it builds proud in yourself and it makes you want to thrive.” This professor appears to be an excellent source of support for this participant and makes him thrive.

Two focus group participants commented on their math professors at MC. One mentioned that “They’re all uh pretty inspiring and helpful” and the other commented, “Here...many professors will help you...” It appears that participants can turn to their professors for help.

Whom do participants owe to their success? Sometimes themselves, sometime others. We asked focus group participants whom they owe for their success, and four participants said they owe it “to myself.” One added, “I know I have a way long way to go ... in my studies but for how far I’ve personally come I feel like there’s no way I’m stopping now.” Another participant added her parents as well as herself as the reason for her success. A first-generation participant explained how he owes his mother who left “everything that she had, everything that we knew and to try and have a better life...to be the best I can be.” Family and one’s own inner drive seem to be key players for the success of the participants.

However, a couple participants mentioned their instructor as a factor for their success. One mentioned his faculty mentor from the AIMS² program and how “he’s the reason I’m graduating one year earlier. So, I, I think one of the major reasons I’m succeeding is because of him.” Another participant said, “I had a teacher who made me very interested in physics and probably without him I’d still be a crappy art major instead of using my brain for something.” It appears that participants owe it to themselves and their sources of support to their success. However, how do the participants navigate through tough times and not give up?

“A lot has to do with just being willing to fail”: Using self-reliance to get through tough times.

We probed focus group participants about self-reliance and how they keep continuing with their academic work as students. In response, a participant volunteered:

It’s just being at the lowest and being able to give in more, cause even when you’re at your lowest, you’re not really at your lowest, you’re just getting there. You have a little more strength to give, to push and to succeed.

Another added that you must “have ... pure grit to just keep on going through it.” By having the strength or the “grit” to keep pushing appears to be a form of reliance. Another participant changes his outlook on the situation by “being able to take a bad situation, maybe make it better or try and make it not as bad.”

One participant uses his past experience of tough times to get him through current ones. For instance, he mentioned, “I believe I spent uh quite a few times away from my family and that prepared me to those tough times where you have only yourself to rely on... so I prepare for the worst and anything else is fine.” For this participant, it appears to be the ability to get through tough times when one is alone. However, for some, it is family that assists with self-reliance. For instance, one participant said, “That’s why I kept on going, cause of them. If not, then I wouldn’t be here.” Family appears to be a key source of support for many of the participants.

Navigating through College with Family Support

Some students have the support of their families while they pursue their college degree, and some do not. Moreover, some students have financial support from their parents and some may have parents that do not know the college system. We inquired about family support among participants during the focus group sessions and discovered that most participants have the support from their parents to experience academic success and complete their degree programs.

“My parents are very supportive”: Navigating through college with parental support. A key number of focus group participants’ parents fully support their college journey. One participant explained how his mother “didn’t get the opportunity to finish her college experience” and commented for that reason, “she’s very supportive in me finishing mine.” A female participant explained how her mother supports her to “be the first female engineer from the family.” It appears that the parents push these two participants to achieve what their family has yet to accomplish.

Several focus group participants’ families push them to continue their education, according to stories that they shared with us. For instance, a participant described: “They supported me becoming an engineer in general. It’s something they’re influencing me to become. Um, cause I was interested in math and science, so they um pushed me to continue school.” Another added, “I think the niche of it all is that she knows I love math a lot, so she continues to push me towards that.” However, one participant explained how his parents did not support him at first, but then they started to push him to continue: “Um, at first my parents didn’t support me going to college... So then after a while they just pushed me. They were like oh, then if you’re doing fine then keep on going with it.” For these three participants, their parents have pushed them to succeed; but for one, it was not from the beginning. It seems that he had to prove to his parents the benefits of furthering his education.

“They provide me with everything”: Succeeding in college with the financial support from parents. A few focus group participants receive strong financial support from their parents. One

mentioned that his parents “will help me, give me money for it. And well yeah, they...want me to do well.” Another added, “they provide me with everything...that’s why I kept on going, cause of them. If not, then I wouldn’t be here.” For this particular student, it appears that he would not be able to succeed academically without the help from his parents.

For one participant, it is tough on the parents to help out. For example, “it’s really tough for them to help me out here so they are definitely proud or they wouldn’t help at all.” Another chimed in that his mother doesn’t provide “any financial support, but uh, as much as she can give” and that “she doesn’t know anything about computer science...I get...her moral support.” The theme of parents not knowing in depth about their majors came up among all three focus groups.

“They wouldn’t really understand the details”: Parents’ knowledge of their college education.

A number of focus group participants mentioned how their parents do not know fully the details of their major and their involvement in the AIMS² program. For example, one commented, “Uh, they don’t really know the details because they wouldn’t really understand the details, like the research that I’m doing...they know that I’m involved in the research and they’re happy. That’s all. No details.” Another participant mentioned how his mother does not know about his involvement in the AIMS² program: “She knows that I’m going to college...She doesn’t know that I’m in the AIMS program but uh she definitely knows that I want to be an engineer so she tries to be there as much as she can...” It appears that even though the parents do not understand about their majors, they try to be supportive.

On the other hand, a few focus group participants explained that their parents are more familiar with and understand their involvement with the AIMS² program and more generally on campus. Here, one participant said, “I talk to them about school all the time...and um yeah they know I’m in the AIMS program and they were pretty proud of me for getting accepted into it.” A participant has a mother with a master’s degree who knows how to navigate through college, but she does not understand the

engineering major fully: “She’s got a masters and I’m still struggling to get up to her level but um she understands the process as far as engineering and ...doesn’t really understand directly.”

A few focus group participants are first-generation college students and their parents do not fully understand the whole process of getting a college education. For example, a participant explained,

They don’t understand engineering cause I’m a first uh generation college student. Um, they don’t know that I’m a part of AIMS. um they are not sure what I do in my day to day, but they know that I’m doing something and they support the idea. But ya it’s a very um vague to them.

Another participant, who is a first-generation high school graduate, explained how his family and parents “don’t quite understand that it’s a process of getting your education. So they expect you to already basically have a job and be going to school at the same time.” It seems that it is hard for this participant’s family to understand that obtaining a college degree is a lengthy process and difficult to do while working full-time.

Summary of Results

From the three focus groups that we conducted and analyzed, it appears that adapting to the college environment was challenging for some participants. However, once the participants transitioned to campus, it seems that they developed the skills to adapt to faculty and peer from various backgrounds. A few participated reported being first-generation college students whose parents are not familiar with campus contexts and degree programs; however, a large number of participants commented that their families support their decision in pursuing college. Further, several participants commented on financial resource struggles with college expenses, and few participants shared stories about receiving financial support from family.

Most participants seem to have a strong support network from the faculty mentors to support their success as engineering or computer science students. From focus group discussions, it appears that the faculty mentors play a significant role in their students’ lives. Indeed, participants frequently

referred to their faculty mentor with stories about interactions with faculty mentors and outcomes from mentoring work with faculty. What we observed is that participants seem to be appreciative of the support they receive from their faculty mentors specifically in terms of accelerating their education through planning their courses/degree programs and working with them in research projects to gain real-world work/professional experience. Another pattern that we noted is how faculty mentors often share with students important information about their majors—and this information/interaction appears to help students set a clear plan for their major and how to transition to the workforces or graduate school after completing their degree program. It seems that participants dramatically benefit from the workshops and field trips with faculty mentors. It also appears that the program faculty and staff promote a welcoming environment for student who have been historically underrepresented, excluded, and marginalized in institutions of higher education; however, there was a mixed response on the competitiveness of program activities and work among peers. Here, focus group participants mentioned how they tend to help each other and how their faculty mentor encourages them to help each other out. Although, female participants commented on the pressure for them to succeed and how some put themselves down that they cannot succeed in engineering.

The feeling of being underestimated was brought up frequently, and it appears that some focus group participants used this to their advantage in order to succeed. The outcome of completing a degree program and a financial gain appeared to be a motivating factor for some participants. For the first-generation college student participants whose parents sacrificed for their education, they felt obligated to succeed as they would let them down if they failed to succeed in getting their degree. The participants all use various resources such as YouTube, study groups, tutoring, and relying on their instructor. But how do the participants not give up during tough times? It appears that it is “pure grit” that motivates them to not give up.

Discussion of Results

This purpose of this study is to examine the relationship between participation in peer and faculty mentoring and research participation and undergraduate student experiences and career and research skill development among Latinx and low-income first-time community college and university student and community college transfer students in engineering and computer science fields at California State University, Northridge (CSUN). The research questions that guided this qualitative case study are:

1. How does student-faculty and peer-peer interaction influence research skill and career development of Latinx and low-income first-time community college and university student and community college transfer students in engineering and computer science fields?
2. How do family and peers shape the academic and social experiences of Latinx and low-income first-time community college and university student and community college transfer students in engineering and computer science fields?

We examined the results to answer the research questions above. For the first research question, we found that student-faculty interaction played a significant role in the success of participants. Here, faculty mentors appeared to increase students' motivation by checking in with them and seem to be "willing to go the extra mile to help" in terms of finding available tutors. With faculty research with participants, faculty mentors appear to have a consequential impact on participant research skill and career development. In fact, we observed that participation in faculty research helps them gain the appropriate skills for their career as engineers. As for peer-peer interaction, participants generally reported that with the way the program is designed, they connect with other students. It also appears that when students see the research projects that other students are working on, it "influences" them to do research themselves. Overall, participants mentioned a welcoming environment among

faculty and peers. However, some participants felt a more competitive atmosphere, and female participants shared stories about gendered expectations to achieve.

For the second research question, we found that many of the students feel supported by their families. However, several participants are the first in their family to attend college and often their parents do not fully understand the college-going process. In fact, a few participants commented that their parents do not know the “details” of their major and involvement with AIMS² because “they wouldn’t really understand.” One participant is currently struggling with explaining to his parents that he cannot work full-time and attend college at the same time. During focus group sessions, it was apparent that their peers understood where others are coming from. From a closer look at the findings, it appears that there is a strong sense of community among the participants and this environment seems to promote the feeling to help others academically. It seems that participants are getting work done faster by collaborating in groups and that they see the benefits of working with each other.

Recommendations for the AIMS² Program

Overall, thematic results from focus group data analysis points to encouraging patterns in student-faculty and peer-peer interaction associated with the AIMS² program and the influences of family and peers. However, we observed several patterns that run counter to the prevailing themes, and we ground the following recommendations in these observations.

Faculty Mentors

From our findings, faculty mentors play an extremely important role in the success of the students. Accordingly, findings point to the need to continue to explore opportunities for interactions between faculty mentors and participants. Specific recommendations here are:

1. Continue to connect CSUN faculty mentors to students at community college partner campuses to facilitate frequent and quality faculty contact with pre-transfer students before transitioning to a university;

2. Consider offering summer-bridge-type workshops and activities for first-year and transfer students to assist with the transition to college;
3. Consider pre-transfer academic advising to form close relationships with first-time transfer students during the transition process.

Peer-Peer Interaction and Peer Environment

It appears that students also benefit highly from their peers. As commented by a couple of participants, when AIMS² “[puts] hard working, motivated, driven, and like-minded people in one room...[and] ideas would fly across the room and we learned a lot from one another” and “seeing them do their research projects and stuff really influences...everyone else to do research.” However, there seems to be competition among the students that may need to be checked upon. It is recommended that AIMS² explore more opportunities for peer-to-peer interactions and specific recommendations are listed below:

1. Consider offering more team-building and social activities to encourage peer-to-peer interaction outside of academic and/or research contexts;
2. Consider expanding peer mentoring—to scale Mentor Collective to pre-transfer community college students.

Program Diversity and Gender Dynamics

From the findings, it seems that AIMS² provides a welcoming environment for its diverse students. However, some feel that their race and/or gender may pose a barrier in achieving their goals. The female participants frequently discussed the pressure to succeed in engineering and how there is a lack of female representation in the panels. Accordingly, the following recommendations can be considered:

1. Sponsor/host talks/symposia on gender and race;
2. For panel discussions, work to include/increase representation of women and women of color;

3. Explore assigning/pairing women students with women faculty mentors.

Overcoming Barriers to College Success

From the three focus groups, we found that students overcame numerous barriers. However, there was one key finding as per one participant: “Honestly, I feel like all the obstacles are happening at the university. And if you accomplish this then I don’t think anything can stop us.” This finding leads us to provide our final recommendations:

1. Extend/expand summer skills workshop session on campus resources for all first-term participants;
2. Consider structuring academic advising to monitor students to ensure they have the resources to address challenges that arise in the first-year/post-transfer;
3. Consider more opportunities to invite family members/parents to social activities or offering a new parent/family orientation.

References

- Barbour, R. S. (2001). Checklists for improving rigour in qualitative research: a case of the tail wagging the dog? *BMJ*, 322(7294), 1115-1117.
- Merriam, S. B. (2009). Qualitative case study research. *Qualitative research: A guide to design and implementation*. San Francisco: Jossey-Bass.

Appendix A

California State University, Northridge
AIMS² Skills Workshop
FOCUS GROUP PARTICIPANT LIST

Facilitator:	Co-Facilitator(s):	Focus Group Number:
Date:	Time:	Site:

<i>No.</i>	<i>Name</i>	<i>Major</i>	<i>Gender</i>	<i>Ethnicity</i>	<i>Initials</i>	<i>First Time Freshman</i>	<i>AIMS²</i>
1							
2							
3							
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Appendix B

FOCUS GROUP PROTOCOL
AIMS² Project Evaluation
Community College and CSUN Student Participants

Facilitator:	Co-Facilitator(s):
Date:	Site:
Participant Group:	Participant Initials (Codes):

I. Introduction/Background**Welcome and introduction:**

Thank you for taking the time to come together for this focus group discussion with us today. This discussion is part of an evaluation study of the AIMS² program. I/we will be leading today's discussion about your experiences in the program. We're not evaluating you—just the program—and your experiences help us adjust what we are doing to improve and enhance your experiences and ultimately your success as a student and career professional.

Format:

Today's session will follow a format that allows for everyone to share and contribute. First, we ask you to use the first initial in your first name and last name to identify yourself before you speak. This will allow us to attribute comments to you as we protect your confidentiality. We will not use your initials in any publishing report or publications and we will redact your initials from transcribed interview files—this is for internal use only. Second, we ask you to respect what others share and allow them to finish their statements before sharing. Finally, you do not have to answer any question or participate in any way in any part of or the entire discussion.

Informed consent:

I/we am/are sharing an informed consent form, which communicates the procedures, potential risks and discomforts for subjects, potential benefits to subjects, payment to subjects for participation, participation and withdrawal, and rights of research subjects. I/we ask you to review, sign, date, and return the form to us now.

Timing:

Today's session will last approximately 60-90 minutes. Are there any questions before I/we start?

NOTE: *Facilitator(s) will substitute "AIMS²" and "CSUN" in the interview questions for community college program and campus name.*

II. Interview Session

Overall—AIMS² Program

1. Share your experiences in the AIM² program. What are your overall impressions of the program? What has worked well? What do you feel you still need from the program?
2. Looking ahead, discuss possible connections, if any, between AIMS² experiences and future career in the workforce. Has your participation in the program supported your development as a professional engineer?
3. What about your family members? What is the sense you get from them? Do you feel that they support you as a college student? In engineering?
 - a. What do they know about what you do at school?
 - b. How do they feel about AIMS²? Do they know you participate? Do they support your participation?
4. Walk us through one experience where you felt that the program made an impact on you. By contrast, take us through an experience where you felt that the program did not do what you expected.
5. We'd like to chat about AIMS² project activities and events. What do you feel is the best event or activity in which you have participated? What about one that you could have skipped? Share details—why?
6. In general, how do your AIMS² faculty mentors make you feel academically? Do you feel like they think you can succeed?
 - a. How do they help you succeed in the major?
 - b. In preparing for a career?
7. Let's continue discussing your AIMS² faculty mentors? Do you find that they:
 - a. Have a genuine concern for teaching students? How did they show this?
 - b. Are personable and approachable toward students? How so?
 - c. Treat students equitably? Please describe how.
 - d. Work individually with those students needing extra help? Can you recall any examples?
 - e. Provide meaningful feedback to students? Anything specifically?
8. Let's continue talking about your faculty mentors. Walk us through a time when you felt that an interaction was productive and positive. From start to finish, share details about what happened and how you felt—step by step.
9. Do you feel like your personal/family background is valued in AIMS²? Why or why not?
 - a. Do you feel like your cultural/family history is recognized in the AIMS² program in what you're learning?
 - b. Do you feel comfortable discussing any life experiences you have during class that are relevant to the discussion in AIMS² faculty mentor meeting? What about with AIMS² faculty in private, such as during office hours?
 - c. What about gender—do you feel like you are valued and welcomed?

10. Now let's talk about your friends in AIMS² for a bit. Can you describe them to me? Do you find that, as a whole, you all place a high importance on college? Do you feel like you can turn to them for help with school? Or to discuss problems?
 - a. Do you feel like your friends from AIMS² value your cultural/family/community history and identity? Do you feel that they accept your ethnic, cultural, and linguistic heritage? In what ways, yes or no?
11. More broadly, does it feel like you are competing with your peers in AIMS²? Or does it feel like everyone wants each other to succeed? Why or why not?
12. Let's discuss peer mentoring now. If you have participated in peer mentoring—either as a mentee or mentor—please share your experiences. What were some of the benefits of peer mentoring? What did you feel was still missing from a mentoring relationship?

Community Cultural Wealth and Funds of Knowledge

13. Why did you choose your major and what?
 - a. What career do you hope to have when you finish?
14. What barriers do you see in your future that may arise?
 - a. Will they affect your academic goals?
 - b. Will they affect your career goals?
 - c. How will you overcome them?
15. What are ways in which you have adapted to a college or university (setting)?
 - a. Do you feel as though you change the way you act depending on the place or people you are interacting with?
16. How do you deal with stress or under stressful situations?
 - a. What helps you?
17. Has there been a point where you have felt underestimated?
18. Have you experienced a moment(s) where you felt that you had to prove someone wrong within class or in the AIMS² program?
19. Who has been influential and/or supportive in pursuing your academic and career goals?
20. Do you feel like you owe it to someone to succeed?
21. What experiences have prepared you for college, university, future career?
22. What is your biggest push to finish your degree and pursue a career?

Closing Questions

I/we would like give you a final opportunity to help us evaluate the grant program. Before I end today, is there anything that I/we missed? Have you said everything that you anticipated wanting to say but didn't get a chance to say?

Compensation (CSUN focus group sessions ONLY):

As a thank you for your participation in this focus group, we would like to offer you a \$5.00 Matamoney gift card. You may pick up your Matamoney gift card from Stacey Schaaf (stacey.schaaf@csun.edu) in the Student Services Center/EOPS (JD 1501) in the College of Engineering and Computer Science, Monday through Friday, 8:30 am to 5:00 pm. Please write down Stacey's name, email address, and office location.

III. Debriefing

Finally, I/we want to provide you with a chance to ask any questions that you might have about this focus group. Do you have any questions at this time? Thank you for participating in today's focus group session. I/we appreciate your taking the time and sharing your ideas with me/us. I/we also want to restate that what you have shared is confidential and that I/we will follow steps outlined in the informed consent form to mitigate risk and protect your confidentiality