First-Year Engineering Technology Students' Experiences with Peer Mentors

Ashish Agrawal
College of Engineering Technology
Rochester Institute of Technology
Rochester, NY, USA
atacet@rit.edu

Michael G. Eastman
College of Engineering Technology
Rochester Institute of Technology
Rochester, NY, USA
mgeiee@rit.edu

Melissa E. Aponte
College of Engineering Technology
Rochester Institute of Technology
Rochester, NY, USA
mxacet@rit.edu

***Abstract*—This research full paper describes first-year engineering technology students' perceptions and utilization of support from peer mentors. Prior research has highlighted students' challenges in adjusting to higher education while also establishing the need for developing a sense of belonging and disciplinary identity for success in engineering programs. Peer mentoring has been shown to ease students' transition from high school to college. This study was conducted in a college of engineering technology at an R2 (high research) university. Students admitted to the engineering technology Undeclared Program take a one-credit Undeclared Seminar course that introduces them to the field of engineering and the different majors through a mini-project, seminars, and interactions with professors, alumni, and current students. As part of the seminar course, students are assigned an upper-class student as a peer mentor. Peer mentors regularly interact with and support their mentees with different aspects of academic life. Data were collected using semi-structured interviews and analyzed using the model of co-curricular support framework. The data analysis suggests that peer mentoring can help students with integration into the academic, social, professional, and university aspects of higher education. The analysis also identified issues that can affect the success of a peer mentoring program including the need for establishing a rapport between the mentors and the students they mentor, and ensuring that peer mentor activities are designed recognizing the already busy schedule of the first-year students.**

Keywords—engineering technology, first year experience, peer mentoring, transition to higher education

I. Introduction

It is widely accepted that the first year of an engineering-related university degree is crucial for students' success and retention in the major. It is during the first year that students start building a disciplinary identity and a sense of belonging, which has a significant impact on their retention and success [1]. As students transition from high school to higher education, they also experience various issues related to academic and social integration into the new academic environment. The development of a sense of belonging is also crucial for a successful transition into higher education [2].

Transition can be particularly challenging for students if they do not have a declared major when they enter the university. While an undeclared major allows students to explore different interest areas, it also prevents them from fully embedding themselves in a particular discipline and building an early foundation in the discipline [3], which is crucial for developing a sense of belonging and transition [2].

To help students successfully transition into higher education, prior scholarship has suggested several initiatives. These include mentoring programs, summer-bridge programs, living-learning communities, and professional seminars [4]. This paper explores the influence of one such initiative, i.e., a peer mentoring pilot program to study the experiences of first-year engineering technology students in an Undeclared Program who have not yet declared an undergraduate major. The following research question guides this work: ***How do first-year engineering technology students perceive and utilize peer mentor support to navigate their transition to college?***

II. Literature and Conceptual Framework

A. Prior Work

Peer mentoring is an academic co-curricular process in which an upper-class student supports underclass students in navigating the different aspects of university life [5]. The nature of support that a peer mentor provides can be diverse and can include social and academic dimensions, while also alleviating the stress that students experience while transitioning into higher education [6], [7].

One key advantage of the peer mentoring process is the temporal proximity of experiences between the mentors and the mentees. In other words, since mentors have recently undergone a similar set of academic experiences, they are well-equipped to guide their mentees [8]. As Kim, Anderson, DeRosia, Madison, and Husman note, "peers also possess greater knowledge in the learning spectrum. While this knowledge can be content-specific, it can also refer to institutional knowledge regarding unspoken norms and expectations" [9, p. 3]. Along similar lines, Lim, MacLeod, Tkacik and Dika describe that peer mentoring programs allow for "the natural flow of informal knowledge that was essential to freshmen's survival through challenging courses and a demanding workload" [10, p. 403].

Budny, Paul, and Newborg [11] provide a model for the mentoring program in which students work with mentors in a small group to support a first-year engineering course. In addition to the direct course support that the mentors provide to the first-year students, the mentors also address key issues around time management, university resources, managing stress, choosing courses, and strategies to apply for co-ops. The authors found that this peer mentoring supports the successful transition of incoming students, which in turn enhances the probability of continued success in engineering.

Moving beyond the support provided to students in a particular course, peer mentorship programs have also aimed to help students build a community at the university. For example, in the context of physics education, Zaniewski and Reinholz [12] describe a peer mentorship program for incoming first-year students in physics. The program involved frequent individual check-ins, social events, and large-group mentorship meetings that enabled sharing of relevant information between students. The authors note that mentoring provided students with academic and psychological support in addition to a favorable first-semester GPA for the participating mentees.

The benefits of peer mentoring go beyond the immediate benefits afforded to first-year students in terms of academic, emotional, and psychological support to helping students develop a sense of belonging and disciplinary identity. Holland, Major, and Orvis [13] found that mentoring positively influences STEM students' satisfaction with, commitment to, and involvement in one's major. Shuman, Heer, and Fiez [14] showed that peer mentoring can improve engineering self-efficacy, i.e., students' self-perception of their abilities to succeed, in first-year engineering students. Patrick, Prybutok, and Borrego [15] have shown that students' self-perception of their abilities to succeed directly influences their interest in engineering, which in turn affects how much students identify with the discipline. A strong disciplinary identity is critically important to students' transition, retention, and success in engineering [1].

B. Conceptual Framework

This work is guided by the conceptual framework of the model of co-curricular support (MCCS) proposed by Lee and Matusovich [4]. This model was developed to graphically present the activities and short- and medium-term outcomes and long-term objectives of engineering student support centers. This model builds on Tinto's [16] framework of institutional departure, which explains students' decision to persist in higher education based on their academic and social interactions. The MCCS highlights "the breadth of assistance required to comprehensively support undergraduate students at the college level" [4, p. 406]. This model was developed based on data collected from service providers and students at six engineering support centers across the US.

Fig. 1 presents the MCCS model. The leftmost column refers to the interventions implemented to support students. The interventions can be in the form of programs, services, or activities. Program refers to an interconnected set of experiences that students undergo. Each program represents a set of interconnected experiences students complete over a more substantial timeframe. Activity refers to a condensed experience in a short timeframe (e.g., one or two classes). Service refers to student support that is ongoing and regularly available [4].

The second column of the figure represents the outputs of the intervention. Lee and Matusovich define outputs as "the intended changes to the institutional experiences of students that result from the internal operations of the inputs" [4, p. 423]. The authors note six areas of output as a result of the interventions. These areas include academic performance, interactions between students and faculty or staff, involvement in extracurricular activities, interactions with peers, experiences related to professional development, and special circumstances including acclimating to the university or navigating identity.

The third and the fourth column in Figure 1 represent the short- and medium-term outcomes, which are defined as "the skills, knowledge, and behaviors that students should attain from experiencing the outputs" [4, p. 423]. The short-term outcomes are represented by students' integration into the academic, social, professional, and university systems in higher education. The original model by Tinto [2], [16] did not include the outcomes related to professional and university integration. These were added by Lee and Matusovich. The medium-term outcomes include students' goals and institutional commitments, and are similar to the goals and commitments described by Tinto. Finally, the fifth column of the MCCS represents the long-term student achievement objectives normally targeted by student support centers. These include degree progress, academic achievement, and career attainment. These long-term objectives contribute to students' development of a disciplinary (in this case, engineering) identity, which is linked to their persistence in the discipline [6].

The MCCS framework provides a suitable conceptual backing to study the influence of a peer mentoring program on the experiences of first-year engineering technology students. The program can be seen as an input, which leads to changes in students' experience in the first year. As a result, the program affects students' academic, social, professional, and university integration in the short term. Section III describes the peer mentoring program in detail including its structure and the activities that constituted the program. Note that for this paper we focus on the first three columns of the framework (as shown in a box in Fig. 1) as we are looking at immediate, short-term outcomes of the peer mentoring program.

III. METHODS

This paper explores the experiences of first-year engineering technology students in a pilot peer mentoring program. Data for this research were collected as part of a larger project that aimed at understanding the experiences of first-year students in a college of engineering technology.

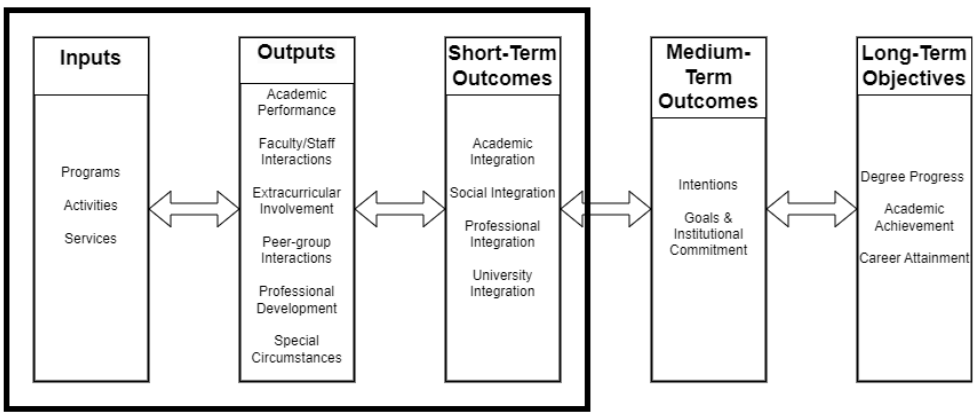

Fig 1. The Model of Co-Curricular Support with boxed part relevant to this paper [4]

More details about the research site, participants, data collection protocols, and data analysis are provided below.

A. Research Site

This study was conducted in a college of engineering technology (pseudonym: College of Engineering Technology and Applied Science [CETAS]) within a technical, R2 university, Mid-Atlantic Technological University (pseudonym) in the United States. The college enrolls approximately 475 first-year undergraduate students each fall, representing 16% of the total university first-year enrollment. CETAS offers six bachelor of science majors in engineering technology and three in applied science. The participants in this study were all enrolled in the Undeclared Program, which provides an opportunity for students to enter CETAS and delay major selection until the beginning of the second or third semester. The Undeclared Program in CETAS attracts approximately 65-75 students each fall, representing just under 15% of the college's first-year enrollment.

During their time in the Undeclared Program, students deeply explore the nine majors within CETAS and investigate other majors in the university if they desire. Because of the university's curricular structure, students may spend one or two semesters in the Undeclared Program without delaying graduation as long as they earn passing grades in all classes. After completing one or two semesters, Undeclared students may enroll in any of the nine undergraduate majors if they are in good academic standing.

Mid-Atlantic Technological University is a Predominantly White Institution (PWI), which attracts students from across the nation and has a small international population. Within CETAS, approximately 65% of the undergraduate students identify as White, 7% as Black, 11% as Latinx, 5% two or more races, 21% as female, and 22% as first-generation students.

One salient feature of the undergraduate programs offered by CETAS is their co-operative education (co-op) program. Students' degree requirements include the completion of one year of co-op. The co-op usually spreads over two semesters and two summers and is interspersed with academic semesters. During co-op terms, students are registered as students at the university. However, they do not pay any tuition during this period.

B. Peer Mentoring Program

Academic leaders in CETAS determined that nearly 15% of first-year students enrolled in the college were leaving the university. Although specific reasons for student departures were not well-documented, many students who left the university had poor academic records. After completing a root cause analysis project evaluating student persistence, the Peer Mentoring program was introduced as a pilot within the Undeclared Program to improve first-year student success and retention with a goal of expanding it to the entire college based on if the program proved successful.

The Peer Mentoring program was tasked with more than helping first-year academic expectations in a rigorous STEM program. Academic leaders understood that students had difficulty with everything from making friends to knowing how to study, to understanding the differences between academic majors. The program is based on the Peer Mentor Handbook created by program leaders, which serves as the guiding principle for its development and implementation. The target mentor-to-mentee ratio for the pilot program was 1:5.

To provide role models from all CETAS majors, mentor recommendations were solicited from all nine undergraduate programs. Mentors were recommended for the program by faculty, staff, and department leaders based not on their academic prowess, but on their ability to develop rapport, social skills, and perceived ability to help students navigate the university [17]. Students who had participated in the Undeclared Program were especially encouraged to apply because of their ability to share personal experiences within the program. Thirteen mentors served in the program during the academic year when this study was conducted.

Mentor training was developed by a team of academic leaders in CETAS. Training was overseen by the college's Student Success Coordinator, to ensure mentors were well-versed in university protocols for student confidentiality, Title IX, mental well-being, academic support services, and other campus resources. Training took place over a two-day period prior to the fall arrival of first-year students.

Throughout the fall semester, peer mentors collaborated to develop and deliver programming for students in the Undeclared Program. They hosted game nights in the main cafeteria on campus, offered laboratory tours, and held sessions on internships, major selection, resume writing, and more. All Undeclared students were invited to join in and bring questions or problems to all programming sessions regardless of which peer mentor(s) delivered the session.

The focal point of peer/mentor interaction was the one-credit Undeclared Seminar course (offered through two sections taught by the same co-instructors) in the fall semester in which all CETAS Undeclared students were enrolled. This class met twice per week for 75 minutes each session. The course is designed as a hands-on learning opportunity to help students understand the various majors within CETAS. Students in the course engaged in a semester-long team project designed to connect real-world problems to the nine undergraduate majors. Students also interacted with faculty, students, and alumni, and engaged in facility tours to learn more about the majors.

The semester-long project was completed by teams of four or five. During the first class session each week, mentors served as project managers, helping guide teams through the project. A total of 16 project teams were created between the two class sections. Most project teams had 4 students and some had 5. Ten mentors were each assigned one project team while three mentors were responsible for managing two project teams each.

While students were working on their projects in class, peer mentors operated as project managers, helping guide student teams to their end goal, providing advice, and asking leading questions but not providing too much assistance. For many first-year students, this was their first experience with an open-ended, ill-defined problem. As such, the peer mentors were responsible for managing the emotions that resulted from this discomfort. Having been through similar experiences before, they helped ensure their mentees that trying new things, thinking outside the box, failing, and persisting through failure were all expected, encouraged, and highly valuable.

During the session, peer mentors also spent time developing relationships with their mentees, learning about their challenges, and helping identify support resources as needed. For the first 15 minutes of those sessions, the peer mentors would meet in small groups with their mentees to learn how they were adjusting to college life, inquire if they needed assistance, and share information about upcoming events or important university milestones. The remainder of that class period was dedicated to project work. Typically, the course instructor would remind students of the project timeline and provide an overview of expectations for the day.

C. Particpants

All CETAS students who completed the Undeclared Seminar course (n = 65) were invited to participate in the pilot study on peer mentoring. A total of 10 students showed interest by responding to the email invitation. All 10 students were enrolled in the study. IRB approval was obtained at the research site before inviting students to participate.

The participant pool represented diversity in terms of self-identified gender and race/ethnicity. All participants identified as US citizens. Additionally, eight out of 10 participants had declared a major at the time of the interview, which occurred during the spring semester of their first year. Table I presents the demographic diversity of the participants. All participants were assigned a pseudonym appropriate for their identified gender and race/ethnicity. Note that we have used the words "student" and "participant" in this paper to refer to study participants.

D. Data Collection

Data were collected in the form of written reflections, in-person interviews, and focus-group interviews. Students were asked to reflect on their experiences of successes and challenges during the semester through an assignment given to them at the end of the seminar course students completed in the fall semester. Interviews built upon the information students provided in their written reflections, and asked additional questions about their background, interactions with the peer mentors, and other significant experiences leading up to and during their first year of college. This paper focuses on the questions asked of mentees during the in-person interviews that inquired about the nature and frequency of interactions with peer mentors, the different areas in which they felt supported by the mentors, and their suggestions for improving the peer mentoring program.

TABLE I. PARTICIPANT DEMOGRAPHICS

Gender	6 female, 4 male
Race/Ethnicity	7 White, 2 Asian, 1 Latinax
Nationality	All US citizens
Major	8 declared, 2 undeclared

E. Data Analysis

Data were analyzed using Dedoose™ in two stages through open and *a priori* coding. Data analysis was performed by the first and the second authors. The first stage of analysis involved the first author individually reading through all interviews and generating codes. These codes were guided by the research questions and the interview protocol but were grounded in data.

The second stage involved assigning the generated codes to the four categories of short-term outcomes as identified by Lee and Matusovich [4]. While some codes easily fit into one of the four categories, there were two issues with fitting some of the other codes into the four categories. First, the codes related to the participants' frequency of interactions with the peer mentors, and challenges in availing benefits from the peer mentoring program did not fit into any of the four categories. Hence, we created separate categories for the nature of interaction and challenges in availing program benefits. Second, a code related to peer mentors helping students adjust to college overlapped significantly with other codes for several interview excerpts. To address this, the first and the second authors together recoded all excerpts within this code and created one new code – Socialization through Events Hosted by Peer Mentors, which more accurately categorized the associated data. This process also led to the creation of operational definitions for the code categories grounded in data. The final analysis resulted in six categories. Table II presents these categories with their operational definitions and the codes within each category.

The trustworthiness of the findings was established in three ways. First, the initial 10 individual interviews were followed by two focus groups, each attended by approximately half of the participants. The data collected in the focus groups were used to support, clarify, or refute the

TABLE II. CODES AND CATEGORIES FROM DATA ANALYSIS

Final Category	**Operational Definition**	**Codes within the Category**
Frequency of Interaction with Peer Mentors	Participant noting how often they interacted with the peer mentor(s) and under what circumstances	Frequency of Interaction with Peer Mentors
Academic Integration	Participant noting how the support from the peer mentor helped with specific courses, or choosing a major	Peer Mentor Helping Complete the Exploration Project, Peer Mentor, Helping with Other Courses, Peer Mentor Providing Encouragement after Poor Academic Performance, Peer Mentor Helping with Course Selections, Peer Mentor Helping in Major Selection
Social Integration	Participant noting how they developed a social network with the university through specific events and interactions with peer mentors	Socialization through Events Hosted by Peer Mentors, Peer Mentor as a Friend
Professional Intergration	Participants noting learning about or engaging with the professional aspects of engineering	Peer Mentor Helping with Internships, Peer Mentor Introducing to Student Clubs
University Intergration	Participants noting learning about the broader aspects of the university life through peer mentor interactions	Peer Mentor Helping Adjust to College Life, Peer Mentor as an Available Resource
Challenges in availaing Peer Mentor Benefits	Participants noting the factors that prevented them from seeking support from peer mentors	Factors Inhibiting Support from Peer Mentors, Time Conflict in Attending Events Hosted by Peer Mentors

data collected in the initial interviews. Second, interviews were independently coded by the first two authors. Any discrepancy in the coding was resolved through discussion and new codes were created, if needed. Finally, the process of assigning initial codes to categories was done by the first two authors. Any discrepancies were resolved through mutual discussion and modification of the operational definition of the categories.

IV. Findings

In this section, we describe the six data categories that emerged from our data analysis. Representative quotes from interviews with participant pseudonyms are presented within each category.

A. Frequency of Interaction with Peer Mentors

Given the interview protocol asked students to comment on the frequency of interaction with the peer mentors, all participants commented on this aspect. Participants' frequency of interaction varied across the pool ranging from a high level of conversations within and outside of the Undeclared Seminar class to low, i.e., limited to the designated times within the seminar. Students who identified a high level of interaction with their peer mentor described reaching out to their peer mentor for support at different times during the semester. For example, Amy was categorized as having a high level of interaction:

I also would reach out to her constantly about, like, I was in intro to digital microsystem controllers last semester and she didn't necessarily TA for that class, but she did TAed for circuits. So she's always in the lab and I reached out to her. So it was nice. Um…I reached out to her a ton… I can't even name really one specific thing that she did, because I really I reached out to her a lot.

It is important to note that Amy's mentor's responsibility as a TA in the college and a resident advisor in the residence could also have helped Amy become comfortable in reaching out for support in different areas. While Adriana did not reach out to her mentor as much as Amy did, she was in regular touch with her mentor. She noted that "every once in a while I like would contact her, I still do".

On the other hand, some students interacted with their peer mentor only during the designated class times or when their mentor checked in with them.

[I did not connect with my peer mentor] like, too often, just like during the class time with the like, put aside time with peer mentors. (Audrey)

However, most students described a moderate level of interaction with their peer mentor. In addition to interacting with peer mentors during the Undeclared Seminar, students noted interacting with them at different social events.

Relative amount, we would have the meetings and I saw her in a class with occasion, she was part of like a leadership thing. I've seen her recent.... I saw like last week for the leadership events that she runs .... (Alexander)

I mean, obviously, we interacted in the class. And then also, we just started like, saying hi to each other. I see him around, like, you know, like, [college] events, and then we'll chat. (Asher)

Other participants also noted attending events, e.g., game nights hosted as part of the peer mentoring program.

B. Academic Integration

Academic integration involved support in three areas: help in different courses, selecting courses for the next semester, and choosing an engineering technology major. Academic integration was the most significant component of the support that the participants received from their peer mentors. All but one participant talked about receiving support from peer mentors that helped with their academic integration.

Participants noted seeking and getting help from the peer mentors in the project required for the Undeclared Seminar.

And like, the [difficulty] with [the project] was like the actual like coding. Sometimes it just would not work for us, we would not get good readings. And for me, it was really fun when all of us were sitting around and [the peer mentor] trying to like electrical engineer, the all the code of all the circuit, and it was just really fun…, one time I emailed him, I was just like, "how do you want like a certain number? Or do you want like a certain thing [in the design]?" (Alexander)

However, the course support that participants received from peer mentors extended beyond the exploration seminar. Several of them discussed help they received in other courses from peer mentors. For example, as Adriana reflected:

In [the Introduction to Engineering course], there was a, I think it was like circuits that we were talking about. And [the peer mentor] seems to know a lot about [it, she] loves it, but I was just struggling at first. And she helped me through that. (Adriana)

Alexander and Adriana each shared experiences in which the mentors provided direct support in an academic course. Others also demonstrated that they were comfortable seeking academic help from their peer mentors. Sometimes, that support was indirect in that peer mentors guided students to the available university or college resources. For example, Amy shared that her peer mentor provided valuable advice about support resources for her calculus class.

I kind of struggled with the calc[ulus] transition, but [the peer mentor] again really like helped me, I guess, see what available resources [were available]. She didn't necessarily like always help me with calc. But just make it apparent to me like what resources I can go to other than just like my professor or the recitations that they had, because I also went to the professor.

Finally, peer mentors support often came in the form of encouragement when students struggled with a course.

I would just rant on how I hate chemistry and how I think I'm failing calculus. And so and he would just like kind of be like, supportive and just like, you know, "yeah, these are hard courses" and like, you know, "you can only do so well". (Ashley)

Other participants also noted how the words of encouragement from their peer mentors helped them come to terms with their struggles and abate questioning their ability to succeed in engineering.

Moving beyond helping with concepts and projects in individual courses, the peer mentors helped students choose

courses for the upcoming semester. For example, as Ashley noted:

I had a question about class selections. When that was coming up, I was like, "how does this work?" I want to be prepared…. So I did ask [my mentor] a lot about that. And he did give me some good feedback.

Ashley went on to add that she would have conversations with her mentor about the classes he had taken and get insights into the courses and the instructional methods adopted by professors in these courses.

Along similar lines, several students noted receiving information about and discussing the various available majors with peer mentors. For example:

Mechanical engineering technology was definitely something I was looking into. And he, that's his major. So it was good to talk to him about, like, his experience when he's studying. And that was helpful, because it was like, mechanical, electrical, computer, and then like, mechatronics robotics, so he, he's the one who helped me, like, understand the mechanical engineering technology major. (Asher)

I think specifically with [the peer mentor] actually works out really well, because she is on the side that I am very not interested in. She's in computer and then like, electrical, so and then I'm more on the mechanical side. So she really helped me to I guess, really broaden my like thoughts about it. (Amy)

It is important to note the difference in the conversations that Asher and Amy had about their peer mentors' experiences in their respective majors. Asher's mentor was studying a topic in which they had a shared interest. Their conversation helped Asher better understand the nuances of the major. On the other hand, Amy's mentor was enrolled in a major that was not of interest to Amy. The conversation about the mentor's major helped Amy learn more about a major she had not fully considered.

In the major-selection process, it appears that students benefit from discussions with peers in majors with which they already have affinity and with peers in majors not currently of interest to them. In this instance, the counter-narrative provided by Amy's mentor helped develop a stronger appreciation for electrical and a better understanding of the similarities and differences between electrical and mechanical. Eventually, Amy selected mechanical engineering technology, which was her initial choice.

C. Social Intergration

Beyond the curricular aspect of student life, peer mentors helped students build a social network through events and friendships. As described in Table II, social integration refers to students' involvement in extra-curricular activities and interactions with peers. For example:

I loved going to the events they hosted, like the Jeopardy nights, or the lab tours, like all that stuff was so fun. They're all such fun people. (Alan)

She definitely was like more like of a friend like someone like now that I'm not in the [Undeclared] program, or now that like she's like, doesn't have to be like talking to me. She still talks to me, and we'd still like talk to each other and stuff like that. So like, so I guess I didn't think like we'd have like that type of relationship. But we do so. (Abby)

Four participants noted forming a social connection with the peer mentors, as evidenced by quotes from Alan and Abby. This was accomplished through attending events hosted by peer mentors or spending time with them in other social situations.

D. Professional Intergration

In addition to receiving support from peer mentors that helped with courses and major selection, peer mentors also helped students integrate with the professional aspects of engineering. For example, Amy described conversations with their peer mentors about applying for summer internships.

I'm looking to get an internship this summer. And she also got an internship over the, like summer after her freshman year. So that was really nice because I was able to talk to her… I wasn't able to make a lot of the [peer mentor-led] sessions where you could go and like build a resume or do something like that. I wasn't able to make hers about that. So I had reached out and … explained my story. And she was like, open arms, like, willing to explain how to, I guess go through the process and help me. (Amy)

For Audrey, the professional integration happened through talking to and learning from her peer mentor about a student club (concrete canoe), in which the mentor was a member. This conversation piqued her interest in the club, which Audrey then considered joining.

We did talk about clubs a little bit to see like, what clubs because I was kind of interested in the concrete canoe one but I ended up joining a different one this year, but next year, I might try the concrete canoe. That sounds pretty cool. (Audrey)

Despite being only first-year students in an undeclared major, it is interesting to note how several participants were keen to engage with the professional engineering workforce and student competition teams. Engaging with a competition team might seem to be a social activity, but it also has professional advantages of helping students get embedded in discipline-specific cultures and practices. It is unclear from her interview whether Audrey's goal to join the concrete canoe team was professional or social integration, or both.

E. University Intergration

While the interaction with the peer mentors helped students better integrate into the academic, social, and professional aspects of higher education, our analysis also pointed to students' learning about and navigating the different aspects of being a university student. Often, this would occur during casual conversations with peer mentors. For example, in the quote below, Ashley describes how talking to her peer mentors and other mentees helped her become comfortable with her own struggles navigating a new learning environment.

And talking with our mentors was kind of nice, just like you talked about your day, how classes are, what you're thinking about them, like, was really nice. And, you know … the other thing is like, you would also hear how students were doing as well within your group, and you're like, "Okay, I'm not doing

too bad", or "they're having the same kind of problem I am having".

Similarly, Alan noted having conversations with his peer mentor that helped him learn to navigate different facets of the university.

It felt nice being able to talk to people, especially like the people in with my peer mentor and other people that also had him. It was nice to talk with them. Think about, get their two cents, take their advice. He had advice also. Being an upperclassman helps.

Alan's quote demonstrates the perceived value of information coming from a student who has recently undergone a similar set of experiences.

Even the students who did not actively seek support from peer mentors felt that they always had access to someone who regularly reached out to them, or whom they could contact if they needed support. This availability of a support system improved students' confidence in navigating the day-to-day struggles of transitioning to the university.

[The peer mentor] was pretty good with like sending a text every once in a while and saying, "Hey, are you guys doing well? Do you need help with anything? Any questions in your classes?" (Abraham)

So kind of be like, instead of like, being like, oh, like, Who do I reach out to? It's like, okay, like this is [the peer mentor]. I have his phone number if I need anything, you know, that was nice. (Asher)

F. Challenges in Avaialing Peer Mentor Support

While students appreciated the support offered by the peer mentors, some also highlighted the challenges in utilizing them as a support system. For example, Ashley described an absence of connection between students and mentors, which inhibited students from reaching out to their mentor for support:

If you were having a problem, like you were mentally like, losing it, I guess, that they would be hoping that you would come to them or something, I guess that doesn't really work too well …. It's just more of like, you know, your relationship with them, is it really close? Is it not?

Similarly, Alan explained that outside of class is "where that stuff happens", and shared that he wished the students had been able to develop stronger relationships with the peer mentors.

Because there was not a strong bond formed between some students and their mentors, the conversations tended to be superficial, as evidenced in the quote below from Asher.

I remember specifically like, during the like in the seminar, we'd have those like, kind of like group sessions with our peer mentors. And then I guess, at least in my group, not a lot would happen there. Because [the mentor] would just kind of go like one by one, and like check in with people. And then I don't know, there just wasn't a lot to talk about. So then it would kind of just end up turning out to be like, half hangout have people on their phones.

Besides the problem of establishing a rapport with the peer mentors, another issue that prevented participants from interacting with peer mentors was a lack of time. As Adriana reflected:

What was really difficult was when peer mentors had like an open slot of like, whether it'd be visiting labs, or just, I guess, the, like, the peer mentors' office hours, I suppose you could say, that didn't really work for me. Because as especially as like a first semester freshman, … on top of everything else that is already on my plate, whether it be personal or just academic, I was already tired.

V. Discussion & Conclusion

This paper aimed to explore how first-year engineering technology students who were exploring different majors perceived and utilized support from the peer mentors assigned to them by the college. We used the MCCS framework proposed by Lee and Matusovich [4] to analyze the interview data based on the four categories of short-term outcomes as outlined in the framework: academic integration, social integration, professional integration, and university integration. To this end, we operationalized the four frameworks based on the data. Our analysis found that the incoming students experienced and utilized the support from peer mentors in all four areas.

Academic integration, which has also been a central area of impact in prior work on peer mentor support [11], [12], was the most cited area by the participants. One distinguishing aspect of the academic support that students received from their peer mentors was in terms of the conversations students had with peer mentors about major selection. Several participants noted talking to mentors about the majors they were considering. Even if they were not considering a major, having conversations with their peer mentor about that major helped broaden their knowledge (e.g., Amy), which further strengthened their decision to choose a major. It is important to note that students valued conversations with upper-class students in choosing courses and majors despite the presence of robust advising support offered by the college. This highlights the value of near-peer relationships and the knowledge and credibility that students who have just been through the same experience possess [9], [10].

Another distinguishing aspect of the peer mentor support, leveraged by two participants was related to internships. We perceive this as unusual given the students were still in their first year of college and not scheduled for a co-op experience for at least another academic year. However, as noted earlier, because all engineering and engineering technology students are required to complete one year of cooperative education at the research site, that career enhancing opportunity is at the forefront of student thinking. Hence, students start looking for internships and co-ops early in their degree.

In line with the prior work [7], the participants in this study also noted relying on the peer mentors for managing stress and seeking emotional support to navigate academic setbacks. Often, this support came in terms of talking to the mentors about a bad grade or difficulties in meeting the requirements for some courses. While this kind of conversation helped several participants, it even led to a better sense of belonging for students. Similarly, further cementing the findings from past scholarship [9], participants in this study described

learning spoken and unspoken norms and strategies required to navigate and succeed in the university environment.

While the findings discussed in this paper largely agree with the prior literature, this research offers two significant insights. First, rapport between a student and their peer mentor is important in fully realizing the success of a peer mentoring program. As some of the participants noted, a lack of connection with their peer mentors prevented them from utilizing their peer mentors as resources. Second, as colleges and universities design support systems for incoming students, they must be cognizant of students' busy schedules accompanied by the burden of transitioning to a new learning environment. As Adriana highlighted, she could not make it to the office hours held by peer mentors because of her packed schedule.

In conclusion, this study confirms the findings from prior research about the benefits of peer mentoring programs for first-year students. Based on interview data, we have shown that the peer mentoring program at our research site helped first-year engineering technology students with academic, social, professional, and university integration, while also highlighting some areas of improvement in the program. Finally, as our data suggest, even if students do not always avail support from their peer mentors, the feeling of knowing that they have help available a text or an email away can significantly mitigate their anxieties of transitioning to higher education.

While this study provides novel insights into first-year engineering technology students' interaction with their peer mentors, it also opens up avenues for future research. Studies can be performed to explore the factors that lead to rapport building between the mentors and the mentees. While this paper focused on the short-term outcomes of the peer mentoring program, future work can also explore the attainment of medium-term outcomes and long-term objectives (as noted in Fig. 1) of the program. Data can also be collected from the mentors to understand their experiences of the program and their subsequent development as engineering professionals. Quantitative data can also be collected to supplement the in-depth interviews to provide a breadth of mentees' experiences.

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