



Promoting Inclusion Through a Peer Mentoring Program

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Abstract—Various studies have shown the need for and importance of inclusion in an undergraduate student’s campus experience, academic success and career development. The Biomedical Engineering (BME) Department organizes monthly department events, such as open house, internship and career workshops, Lunch and Learn with employers, and holiday parties. These events are always well received and help to connect and engage with the BME students. We have also noticed that many first-year students do not attend these events, which could negatively impact the retention and student academic progress. The COVID-19 pandemic has added further challenges especially for the first-year students to make connections and socialize as easily as prior to the pandemic. We started a BME peer mentoring program with the main goal to help incoming first-year students make a smooth transition from high school to college. Every student is assigned a BME mentor. The mentors are Biomedical Engineering Society (BMES) chapter officers and/or Biomedical Engineering Honor Society members. The mentors start email communication with the mentees in the summer. At the meet and greet in the first week of the fall semester, the BME Department office introduces expectations for the mentors and mentees, such as monthly one-on-one meetings, participation of at least one BMES and/or BME department events every month, and completion of end-of-semester surveys. It also provides essential support throughout the year to facilitate the program by providing mentor training, keeping an open-door policy to address any concerns from the mentors or mentees, channeling their need to other offices, and promoting the value of peer mentoring and learning. It is expected that the mentoring program will help build peer relationships between the mentors and mentees, encourage first-year students to progress towards their educational goals, and enrich their campus experience. The mentors will also benefit from the program with enhanced confidence, leadership and communication skills. We report in this article the process of

implementing our peer mentoring program, major findings, student survey results, and lessons learned.

Keywords—Inclusion, Peer mentoring, Biomedical engineering, Undergraduate, Extracurricular.

CHALLENGE STATEMENT

Various studies have shown the need for and importance of inclusion in an undergraduate student’s campus experience, academic success and career development.^{1,4} In an effort to engage students and promote inclusion, the Biomedical Engineering (BME) department has been running monthly events, such as open house, internship and career workshops, Lunch and Learn with employers, and holiday parties throughout the semesters. Despite the department office’s email reminders and flyers, BME first-year students were rarely seen in these events, whereas junior and senior students showed enthusiastic participation. In the BME department exit interview from 2018 to 2021, approximately 10% of the graduating seniors suggested better support in their first year could help enhance their college experience.

BME students take mostly general education courses taught by non BME faculty along with students in many other science and engineering programs in their first year. BME junior and senior students take mostly BME courses in single sections, and have a lot of interactions with BME faculty, staff and their peers. The lack of first-year student participation in department events could be partially due to the relatively less opportunity for them to hear about the department events, and interact with their BME faculty and peers. The COVID-19 pandemic has added further challenges especially for the first-year students to make connec-

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tions and socialize as easily as prior to the pandemic. Successful transition from high school to college is a key factor in the student's academic success and promoting retention.^{2,10} While the BME department faculty and staff keep an "open door" policy and make themselves available to address student concerns, many first-year students are not accustomed or confident to seek help when they first enter a new academic environment.

NOVEL INITIATIVE

Situative learning is a perspective that has received increasing attention in engineering education. It emphasizes the social and material context, activities and interactions, and participation and identity.^{8,9} This theory supports the importance of instilling a sense of belonging and professional identity for engineering students. Many types of networks can help to support a student's college experience, such as administrative and support staff, faculty, peers, off-campus groups, alumni and employers. Peer support is considered to be the most important for stimulating the sense of belonging and promoting inclusion.⁶

We started a BME peer mentoring program in Fall 2021 with the main goal to help incoming first-year students, especially those overwhelmed at the beginning of their college life, to gain useful tips and insight from experienced peers and become more engaged with the BME department. This mentoring program was focused on the peer network. The BME faculty and staff networks would play a supporting role to provide general guidance and facilitate mentor-mentee interactions. We designed the program timeline and deliverables to allow us to track the mentoring progress with enough flexibility on specifics of mentoring activities.

The mentors and mentees started the program as two interrelated yet slightly different communities. The mentors were already part of the campus community and would expect to enhance their leadership and communication skills through this program, which could help prepare them in entering the next stage of professional community. The mentees would aim to successfully transition from high school to the college campus community. Different mentor and mentee experiences and expectations have been mentioned in some literature.^{5,7} However, how they unfolded have not been closely examined. We tracked the student participation in the department events throughout the Fall 2021 semester, and conducted surveys to gather the mentors and mentees reflection on their experience, which could allow us to obtain a glimpse of how the two identities converged and diverged during the mentoring process.

There were 20 BME first-year students in Fall 2021. Each of the 20 students was assigned a BME mentor. The mentors are Biomedical Engineering Society (BMES) chapter officers and/or Biomedical Engineering Honor Society members. The mentors understood that they were not paid to participate in the program. But they all expressed willingness and enthusiasm to help the incoming first-year students. Key events coordinated by the BME department included:

(1) Email introduction

In the beginning of August, the BME department office sent an email to each first-year student to introduce the mentoring program. Each mentor also sent individual emails to their mentee(s) to start the communication.

(2) Meet and greet

In the first week of the Fall semester, the department hosted a Meet and Greet for all mentors and mentees. The following responsibilities/expectations for the mentors and mentees were introduced:

Responsibilities of Mentees

- Discuss needs/goals and method of communication with the mentor at the Meet and Greet.
- Devote time to the mentoring relationship and interacting with the mentor.
- Keep the mentor informed of academic progress, challenges and other concerns.
- Have monthly one-on-one meetings with the mentor.
- Attend at least one BME or BMES event each month.
- Complete end of program survey.

Responsibilities of Mentors

- Take initiative for contacting the mentee and staying in touch.
- Devote time to the mentoring program and be available when requested.
- Share knowledge and experience with the mentee.
- Be responsive to mentee questions and concerns.
- Maintain confidentiality of the information shared by the mentee.
- Assist in the development of materials and resources in supporting freshmen.
- Complete end of program survey.

(3) Mid-term survey

The department ran an electronic mid-term survey, which asked open-ended questions about events the mentors and mentees had attended, how they felt about their meetings and what could be changed/improved to make the program more useful for them. Reviewing the anecdotal feedback provided the BME office staff some preliminary understanding of the program progress and basis of intervention if needed. For example, two mentees couldn't meet with their mentors citing difficulty in scheduling meetings. One student athlete mentee was then re-assigned to another mentor who was in the same sports team. The other mentee was re-assigned to a mentor who was the teaching assistant of the course the mentee was taking. The mid-term survey was also conducted when every BME student met with a BME faculty member for advising. The first-year students were reminded at the advising meetings to keep their monthly meetings with their mentors.

(4) Mentoring appreciation ceremony

A mentoring appreciation ceremony was held before the end of the fall semester. Every mentor and mentee received a certificate of completion in this program. Speakers include the College of Engineering Dean and the Department Chair. The mentors and mentees were also given end of program survey to complete. They were encouraged to stay connected and reach out to the department office in their continuing study or career. The ceremony was followed by the Holiday Sweet Treat, which replaced the traditional annual BME Holiday Party due to the COVID restrictions, and was enjoyed by all the mentors and mentees.

REFLECTION

Eighteen out of twenty first-year mentees (90% response rate) responded to the end of program survey, which consisted of one ordinal scale question and six open-ended questions.

Table 1 lists the mentees' overall experience with the mentoring program. 56% of the mentees felt the program was helpful. Of the remaining eight students who

felt either neutral or the program not being helpful, six were student athletes who could not meet with their mentors due to their practice/game schedule.

78% of the first-year students have attended at least one department or BMES events in Fall 2021. When asked which event they liked the most, many of them mentioned the Open House and Holiday Sweet Treat (Holiday Party before COVID). We first started these two events in Fall 2019, and the number of first-year students who came to the events were 2 and 3, respectively. In Fall 2020, two first-year students attended the Open House and four came to the Holiday Sweet Treat. The number increased to 7 and 10, respectively in Fall 2021. More first-year students also showed up at the monthly BMES meetings and attended various skill training workshops and seminars.

For mentees who were able to meet with their mentors, what they felt as most helpful was their mentors' advice about what classes/sections to take and how to do well in coursework. Many of them also appreciated the mentors' sharing their own internship/research experience, and the fact that they had someone senior who they could talk to and understood their challenges in their first semester of college.

The survey also asked the mentees their proudest achievements and most challenging experience in their first semester. 89% of the students were proud of their academic achievements. 50% of the students found it most challenging to manage time and balance coursework and extracurricular activities. A few students mentioned specific classes, and two other students pointed to stress and adjusting to independence.

All mentors surveyed showed highly positive experience with the mentoring program. 90% of the responses listed talking and/or sharing experience with their mentees as what they liked most about the program. Some commented that they remembered "being lost as a freshman", or "being scared in their shoes", and were happy that they were able to help the first-year students achieve a successful transition in college. 20% of the responses mentioned explicitly increased sense of leadership from the mentoring program. 50% of the mentors cited finding time to meet as the main challenge. Many mentors would send multiple emails and texts to encourage and remind their mentees about mentoring meetings. The mentors also provided suggestions to improve the program, such as more structured meetings, setting goals and tracking growth,

TABLE 1.. Mentee overall experience with the peer mentoring program.

	Most helpful	Helpful	Neutral	Not that helpful	Not helpful at all
% of students	28	28	28	6	10

faculty and staff reminder and encouragement of the first-year students to attend events, and a mid-semester group mentoring session to bring all mentors and mentees together. One student suggested making the mentoring program optional for first-year students, given the difficulty in finding time to meet with his mentee due to scheduling conflict. It is also worth mentioning that at the recent exit interview of graduating seniors, those who served as mentors all expressed pride in being part of the mentoring program to help the first-year students transition to college.

A key characteristic of peer mentoring is to build relationships that are personal and reciprocal.³ One important result from our study is the convergence of the perceived positive experience from both mentors and mentees in the program. It is also interesting to note that the mentors seemed to show more initiative and enthusiasm in the program, even though the mentees seemed to benefit more in terms of college experience. Although our mentoring program did not include tracking the students' classroom grades, it is encouraging to see that majority of the mentees were proud of their academic achievements in their first semester. Many students perceived the mentoring program to be useful in their first-year transition and help them more easily integrate into the campus community. In particular, the level of participation in department and BMES events showed marked increase in first-year students.

The long-term goal of the mentoring program is to increase the engineering perseverance and retention for the BME students. Although no official retention data is yet available for the BME Fall 2021 class, all 20 students were noted to return to campus in Spring 2022. Future studies will be conducted to analyze the effect of this program on retention.

One issue discovered in our mentoring program is the inability of many student athletes to fully participate, meet with the mentors and attend department events due to their busy practice schedule. A possible solution is to pair up the mentor and mentee in the same sports team, which creates more opportunities of interactions. The student athletes are also required to have 6 hours of study every week in the Academic Achievement Center (AAC). Top performing BME students working as AAC tutors can be assigned the additional role of mentors for these student athletes.

The relatively small size of the program makes it easy to track student progress. Our peer mentoring model is based on pairing first-year students with BMES officers and BME honor society members. Top one fifth of junior students and top one third of senior students are eligible to be initiated as BME honor society members. So the peer mentoring model could be applied to larger BME programs if enough student

honor members and BMES officers can be recruited to be mentors. At the same time, implementing peer mentoring in larger programs will require increased amount of tracking and coordination. Allocating stipend for student participants from the department budget may provide an additional incentive to recruit mentors, encourage mentee participation, and gain more data about their experience.

In summary, our peer mentoring program showed preliminary promising results of promoting inclusion of first-year students in department and BMES events. It is especially encouraging to hear some mentees comment that they would like to be mentors when they become seniors. Potential improvements to the program include more targeted assignment of mentors to student athlete mentees, additional training, support and recognition for mentors, helping both the mentors and mentees set up more specific goals and tracking progress, and mid-term group mentoring sessions to promote interactions among all mentees.

AUTHOR CONTRIBUTIONS

Both authors contributed to the study conception, design, implementation and analysis. The manuscript was written by YL, and edited and approved by OT.

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None.

DATA AVAILABILITY

NA.

CODE AVAILABILITY

NA.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

ETHICAL APPROVAL

The Lawrence Technological University Institutional Review Board (IRB) determined that the study and the student data are not subject to IRB approval.

CONSENT TO PARTICIPATE

NA.

CONSENT FOR PUBLICATION

NA.

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