

## **Using Peer Mentoring to Enhance Transfer Student Experience and Increase Student Success in Mechanical Engineering**

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## 1. Introduction and Background

This paper describes a new peer mentor program for mechanical engineering transfer students at the University of Utah. The program was initiated to help address issues transfer students face when transitioning from a two-year to a four-year institution. In general, the top three reasons students leave an engineering-based discipline are: (1) a perceived lack of belonging in the program, (2) issues related to difficulty of curriculum and (3) poor teaching or advising.<sup>1</sup> These issues are often exacerbated in the transfer process as transfer students adjust to their new academic environment and begin taking advanced engineering courses.<sup>2</sup>

Engineering transfer students typically transfer from a community college or state college to the university level in the third year of the program. Nationally, and among all disciplines, only 42% of transfer students go on to complete a bachelor's degree. For STEM transfer students with an associate's degree, only 32% go on to complete a bachelor's degree.<sup>3</sup> At the University of Utah, most students who transfer into the mechanical engineering program go on to receive their degree. However, the transfer experience is often less than ideal, with transfer students frequently encountering issues with course articulation, registration, larger class sizes, higher level coursework, access to professors, and a lack of peer network to create study groups.

Peer mentor programs have been shown to increase both student success during the transition to higher education and overall satisfaction with the university experience.<sup>4</sup> In an effort to help new students be successful and feel included, the Department of Mechanical Engineering at the University of Utah has implemented a peer mentor program to serve all students new to the major, including incoming first-year and transfer students. This paper will focus on the transfer students, which comprise approximately one third of a typical third-year class. The peer mentor program distinguishes itself from similar programs in the following ways: (1) the program is administered by the mechanical engineering department and services only mechanical engineering students to allow for major-specific focus and unity between the peer mentors and their mentees; (2) the program serves all students new to the mechanical engineering undergraduate program (as opposed to serving only students who choose to opt in); (3) peer mentors are recruited on a volunteer-only basis; and (4) efforts were made to match mentors and students based on common demographics and interests.

## 2. Program Description

The benefits of peer mentor programs, as described in the introduction, are being realized throughout higher education as these types of programs are becoming more prevalent.<sup>5</sup> The structure of the numerous programs in existence varies widely in size, scope, and goals. The short and long-term goals of the program described in this paper include providing a sense of belonging within the department and university, supporting student success by promoting campus resources, facilitating the transition to a different academic environment, and increasing retention and graduation rates within the major. This program is unique in several ways,

including the program administration, organization, recruitment of volunteers, and matching of students with mentors, which will be described in more detail below.

### **Program Administration**

The peer mentor program is administered at the department level, and focuses only on students in the mechanical engineering program. Some programs on the same campus and at other institutions include students from many different majors, who may or may not be assigned a mentor from the same major. This department's internal approach allows for a major-specific focus and a higher degree of connection and rapport between mentors and mentees. For example, the mentors can easily relate to situations that mentees are going through, as they have most likely had similar experiences with specific courses and professors. The mentors are also familiar with faculty, staff, and administrators within the department, so mentors can easily direct mentees to appropriate resources. Focusing on students in one major also allows the administration of the program to flow more smoothly, as peer mentor events and mentor/mentee interactions can easily be coordinated with department events.

### **Program Organization**

In order to reach as many students as possible, peer mentors are assigned to every new student in the mechanical engineering program. Students who do not wish to participate may opt out, or choose to have no contact from their assigned mentor at any time. This varies from other programs that are strictly "opt-in," where students must proactively request to be paired with a mentor. The advantage to assigning all new students a mentor is that students who do not feel comfortable asking for help, or who do not initially perceive a need for mentoring, have ready access to a mentor when a need arises.

### **Mentor Recruitment and Benefits**

Peer mentors are recruited on a volunteer-only basis and are unpaid, which is different from some other programs that may provide a salary, stipend, or other financial compensation. The peer mentor program uses forms of non-monetary compensation and benefits, such as mentor-specific training and access to exclusive events and activities. For example, the mentors benefited from a private resume workshop presented by Career Services in the week leading up to the College of Engineering Career Fair. Some social activities (e.g., pizza or dessert socials) brought the mentors together to share their thoughts and experiences with the program, while others (e.g., bowling and bubble ball soccer) provided an opportunity for the mentors to spend time with their mentees. In addition, inherent benefits of being a peer mentor include enhancing one's resume, gaining leadership skills, networking with the other mentors as well as the mentees, and feeling good about helping others, all of which are relied upon as forms of compensation.<sup>6,7</sup>

### **Mentor Matching**

Because of the diversity in age and educational experiences inherent to transfer cohorts, efforts were made to match mentors and students based on common demographics and interests. This was accomplished by asking both new students and mentors to complete an online survey. Mentees who did not complete the survey were randomly matched with a mentor. This approach

to mentor/mentee pairing – which considers multiple factors as much as is possible – is different than that of many other programs where students are randomly assigned a mentor or paired based on a single factor, such as gender or major.

### **3. Program Structure**

#### **Peer Mentor Coordinator**

To manage the peer mentor program, a peer mentor coordinator was hired by the department. The peer mentor coordinator is a student in the department, and was selected based on previous service contributions and leadership experience. In addition to serving as a mentor, the coordinator is responsible for recruiting and training mentors, assigning mentors to mentees, assisting in organizing events, and ensuring that mentees are contacted in a consistent and timely manner. The peer mentor coordinator communicates with the peer mentors on a bi-weekly basis in order to remind the mentors about mentee contact deadlines, pass on information from the advising office, or inform the mentors of upcoming events. The coordinator reports directly to the department Academic Advisor, and is overseen by the Director of Undergraduate Studies. The peer mentor coordinator receives financial compensation for his/her efforts.

#### **Mentor Recruitment and Selection**

A request for peer mentors was sent to mechanical engineering juniors and seniors during the summer of 2015 via an email announcement and online application. Additional mentors were recruited by the Peer Mentor Coordinator. In addition to the online application, potential mentors were interviewed by the program Academic Advisor and the Peer Mentor Coordinator. In selecting the mentors, factors such as grade point average, extracurricular, volunteer and leadership activities, family situation, and academic pathway were considered in order to assemble a diverse group of mentors. The selected mentors encompass a wide range of demographics, including veteran, international, women, men, honors, fraternity/sorority, and LGBTQ students. Race was not considered as an identifying factor for grouping.

#### **Mentor Pairing**

As mentioned above, one unique concept of this peer mentor program is that new students are matched with mentors of similar backgrounds, interests and experiences. In August 2015, new students were asked to fill out an optional survey to assist in matching the students with mentors. The survey questions queried students about things such as family situation, work and volunteer status and experience, veteran status, group associations, and student interests – mirroring the questions asked on the mentor application. Students that responded to the survey indicating they would like to be assigned to a mentor based on the information provided were grouped accordingly. Students that did not respond to the survey or did not want the information used were randomly assigned to a mentor.

Transfer student mentors were assigned 15-20 transfer students, depending on the availability and willingness of the mentor. The department has noted with email tracking software that transfer students are less likely to respond to email communications. As such, it was anticipated that transfer students would be less likely to communicate with their peer mentors. In addition, it was assumed that transfer students are more mature and independent. Therefore, mentors serving

transfer students were assigned a higher number of mentees compared to the mentors serving first-year students in the program.

### **Mentor Expectations**

Peer mentors are not counselors, academic advisors, or tutors. Their role is to help mechanical engineering transfer students feel welcome and adjust to the differences between types of higher education institutions (in most cases coming from community college to a four-year university). For example, the mentors help mentees become familiar with on-campus resources and give advice on how to approach the third-year courses, which are the most academically rigorous in the program. Peer mentors encourage mentees to interact with teaching assistants and professors on a regular basis, seek out tutoring resources, and form study groups to become more successful in classes. The mentors are also expected to keep notes regarding interactions with mentees. Mentors are instructed to direct students to appropriate resources for any issues beyond the scope of their responsibilities as mentors.

### **Mentor Training**

Peer mentors were provided training prior to the beginning of the fall semester. The purpose of the training was to (1) explain the expectations of a mentor, including expected frequency of contact with mentees, (2) familiarize mentors with programs and services offered on campus, (3) introduce the mentors to one another, and (4) review the Peer Mentor Handbook, which is a resource manual that outlines expectations and summarizes available resources. Additionally, representatives from the university Counseling Center, Career Services, and other student advocacy groups gave short presentations about services available to students through their respective programs. Additional trainings and meetings were held throughout the semester, where the mentors could network, share experiences, and discuss best practices. Additional mentors were needed for new students starting in the spring semester, so the introductory training was also provided for the new mentors prior to the start of spring semester.

### **Mentor/Mentee Social Events**

Several events were held during the Fall 2015 and Spring 2016 semesters that allowed mentors and mentees to make face-to-face contact in a social setting. A fall semester kick-off barbecue provided the first formal opportunity for mentees to connect with their mentors in person. The barbecue also gave students a chance to mingle with faculty and staff. A similar event was held at the beginning of the spring semester. Donuts and hot chocolate were served, and new students starting in the spring semester were able to meet their mentors for the first time. Other events such as bowling and bubble ball soccer were held in the middle of each semester, with the intention of creating and strengthening relationships outside of the academic environment. The hope in providing these opportunities for social interaction is that the students will feel a stronger connection to the department and university, build stronger relationships with each other, and thrive academically and socially because they are having positive experiences. The plan is to continue to offer social activities at least once or twice per semester going forward.

## **4. Assessment**

### **Program Success**

The peer mentor program is in the first year of implementation. Preliminary assessment of program goals was achieved through voluntary student surveys, records kept by and feedback from mentors, and administration and faculty perceptions. In addition, GPA and retention data for students served by the peer mentor program were compared to historical data.

The student surveys sought to ascertain student perception of the peer mentor program and interactions with a mentor. At the beginning of the Fall 2015 semester, a pre-survey was sent out to all new incoming students. A similar survey was administered at the end of the semester. In addition to helping us assess the success of the program in the first year of its existence, the survey data will provide a baseline as improvements are made in future academic years. Mentors and mentees were also asked to share extraordinary stories regarding how they had helped mentees in specific instances, as well as general thoughts regarding the program. These open-ended responses are considered as a means of determining program effectiveness, while also giving insight to changes that need to be made within the program.

In order to assess impact on academic success, cumulative transfer GPA at time of admittance to the program is compared to term GPA after the first semester in the program. Similar data for native students is used as a comparative baseline. In addition, retention data were compiled by comparing the number of newly-admitted students who were enrolled in junior-level core mechanical engineering courses in the fall to the number of those students who successfully progressed to second-semester junior-level core mechanical engineering courses in the spring.

### **Survey Results**

Survey questions probed the mentee's perceived sense of belonging in the program, knowledge about campus resources, and desire to continue in the mechanical engineering program. The pre- and post-surveys asked respondents to rate statements on a scale of 1-5, with 1 being not helpful/not beneficial and 5 being very helpful/very beneficial. The survey results are summarized in the table below. The pre-survey included data for incoming sophomore transfer students, which accounts for the higher number of respondents.

The surveys also included open ended response questions. In these, respondents were split regarding the overall effectiveness of the program. A common theme among the responses was that the mentees were not made aware of how the program was supposed to work. As communication was meant to occur infrequently (approximately 5 times a semester, unless the mentees reached back), mentees were concerned that they were not receiving enough communication.

	How helpful has having a mentor been in increasing your sense of belonging in engineering?	How helpful has your mentor been in letting you know about campus resources?	How helpful has your mentor been in inspiring you to continue to pursue engineering?	How much personal contact have you had with your peer mentor?	How beneficial has having a peer mentor been in improving the quality of your university experience?
Pre-Sem. Mean	3.88	3.77	3.57	3.21	3.75
Pre-Sem. Std. Dev.	0.87	0.94	1.12	0.85	0.96
Respondents	43	43	44	43	44
Post Sem. Mean	3.0	3.13	3.38	2.5	2.88
Post Sem. Std. Dev.	1.5	1.36	1.58	0.71	1.54
Respondents	8	8	8	8	8

### **Mentor Records and Feedback**

Each mentor tracked his/her communication with mentees. Overall, only about 35% of all mentees ever responded to their mentors. This varied from mentor to mentor. The highest response rate was over 75%, with the lowest response rate being 15%.

Mentors who made contact with mentees indicated that they were able to share experiences and knowledge with their mentees. For those mentees who were willing to reach back, mentors were able to connect with transfer students on a personal level. These mentors were able to give advice regarding research opportunities, internship positions, or getting through challenging junior courses.

In one case, a student who was not in the considered mentee demographic was recommended to the program by their academic advisor. Upon being assigned a mentor, this student was able to get information about resources concerning the department, emergency scholarship funding, counseling services, and university clubs. This student identifies with a group that is deemed high risk for dropping out, which made the support even more important.

## Administration and Faculty Perceptions

The peer mentor program has been perceived positively within the Mechanical Engineering department and the College of Engineering at the university. Professors have stated that such a program helps bring the student body closer together, which provides many benefits to the department as a whole, including the perception that the department cares about its students and is doing things to facilitate their success. The Dean of the College of Engineering has expressed interest in using this program as a template and standard of best practice for every department in the College. Advisors appreciate that a group of upper-division students are available to assist lower-division students with specific questions that they may not have the answers to because they themselves have not been through the program.

## Retention Results

Enrollment in junior-level mechanical engineering courses was used to determine retention and was compared with historical data. The table below shows the number of new transfer admits who enrolled in junior-level courses in the fall, the number of those students who successfully progressed to second-semester junior-level courses in the spring, and the percentage of junior-level transfer students retained in the program. Data are provided for 2015-16 and the two prior academic years.

Academic Year	New transfer admits enrolled in junior courses (Fall)	Subset enrolled in second-semester junior courses (Spring)	Retention Rate
2013-2014	49	45	91.8%
2014-2015	46	45	98.8%
2015-2016	35	35	100%

## Grade Point Average Data

Cumulative transfer GPA at time of admittance to the program was compared to term GPA after the first semester in the Mechanical Engineering program. Average GPA data for the current academic year and the two prior academic years are shown in the table below.

Year	Average Admit GPA	Std. Dev.	Average First Term GPA	Std. Dev
2013-2014	3.34	0.4	3.15	0.7
2014-2015	3.33	0.4	3.06	0.6
2015-2016	3.40	0.3	2.98	0.8



In order to establish a comparative baseline, GPA data for native students (i.e., students who took the introductory mechanical engineering design course at the university) was compiled. Limiting the data to full-time students – those taking at least three of four core junior-level courses nominally scheduled for the first semester of the junior year – provided the best comparison. Data for both full-time transfer students and full-time native students is shown in the table below. For transfer students, the table lists average transfer GPA (at time of admittance). For native students, the table lists average cumulative university GPA coming into the semester when the first-semester junior courses were taken. For both sets of students, the table lists the average GPA earned in core junior mechanical engineering courses only (as opposed to the actual term GPA provided in the table above, which may have included Math, lower-level ME, or General Education courses). The average difference between admit/incoming GPA and junior mechanical engineering GPA is also shown. Standard deviations are provided in parenthesis. The average GPAs of all full-time students was consistently 3.07-3.08 for all three academic years.

Academic Year	Full-Time Transfer Students				Full-Time Native Students			
	Number	Average Admit GPA	Average First Term ME GPA	GPA Change	Number	Average Incoming GPA	Average Junior First Term ME GPA	GPA Change
2013-14	39	3.34 (0.39)	3.29 (0.54)	-0.05 (0.50)	77	3.18 (0.46)	3.09 (0.72)	-0.09 (0.50)
2014-15	34	3.34 (0.42)	3.08 (0.58)	-0.26 (0.63)	73	3.34 (0.39)	3.08 (0.56)	-0.26 (0.38)
2015-16	26	3.44 (0.39)	3.13 (0.61)	-0.30 (0.55)	70	3.38 (0.38)	3.02 (0.70)	-0.36 (0.48)

## 5. Discussion of Results

### Survey Data and Open-Ended Responses

Comparing the pre- and post-survey results, there was an across-the-board drop from what the mentees were expecting compared to what they received. The highest post-survey ratings indicated that the peer mentor program has been at least somewhat successful in increasing student sense of belonging, informing students about campus resources, and inspiring students to continue to pursue a degree in engineering. Mentors were less effective than mentees expected in regards to communication and improving the overall university experience. However, it should be noted that no students chose to opt out of the program. Even students who reported that they did not need assistance from a peer mentor still chose to receive emails from their mentor.

Anecdotally, several mentees who faced extraordinary circumstances during their first semester at the University of Utah were profoundly impacted by their mentors.

Lack of communication by some mentors was noted in the mentee responses. One possible reason for this is that the mentors may have become overwhelmed with their semester schedule, preventing them from contacting their mentees in a timely manner. They may have initially reached out and then not made consistent contact throughout the rest of the semester. In addition the mentors are volunteers, and as such may be less likely to perceive that their peer mentor responsibilities are more important than their own academic or outside commitments.

### **Retention and GPA Data**

All junior-level transfer students who were admitted to the program for the fall 2015 semester remained in the Mechanical Engineering program for the spring 2016 semester. The historical data indicates that transfer retention was trending in this direction, so it is unclear whether the 100% retention is a direct result of the peer mentor program.

Looking at term GPAs for the first semester at the University, it is not clear that the peer mentor program impacted academic success of the mentees, as the 2015-16 junior transfer cohort transfer performed worse in their first term at the university compared to students from the prior two academic years. However, in comparing full-time transfer students to full-time native students, it is clear that the transfer students are faring very well academically – as well or better than the larger population of native students.

## **6. Conclusions and Recommendations**

In summary, the goals of the peer mentor program were to provide a sense of belonging within the department and university, support student success by promoting campus resources, facilitate the transition to a different academic environment, and increase retention and graduation rates within the major. Survey results indicate that the program was successful in impacting both sense of belonging and knowledge of campus resources. Preliminary retention results are very promising, although retention was already trending towards 100%. Since the program is in its first year, data are not available for longer-term retention or graduation rates. It is not clear from the GPA data that the peer mentor program directly impacted academic performance during the first year of the program. However, transfer students into the mechanical engineering program have historically performed well and continue to perform well compared to native students, which speaks to the strength of the programs at the transfer institutions. Clearly, more data are needed to determine the long-term benefits of the peer mentor program. The 2015-16 mentee cohort, as well as future cohorts, will be monitored for academic performance, retention, and time to graduation.

The department views peer mentors as a valuable resource for incoming transfer students, and will continue the program beyond the current academic year. In response to mentee feedback, efforts will be made to ensure that mentors continue to communicate with mentees throughout

the semester. In addition, while the BBQ and other social events were effective in connecting some students and mentees, more opportunities for face-to-face meetings would likely be beneficial. The College of Engineering has expressed interest in implementing similar programs in the other departments in the College. It is anticipated that the experiences and results of the peer mentor program in Mechanical Engineering will be used to inspire and improve peer mentor programs throughout the College.

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