Work in Progress: Establishing a Peer-Mentoring Program for Transfer First-Year Engineering Students

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Abstract

This work in progress will explore the success of a peer mentoring program for transfer students in the First-Year Engineering Program.

The First-Year Engineering Program (FEP) aligns with the University of Arkansas College of Engineering's (CoE) objectives to enhance student retention and promote timely graduation rates at our institution. Since FEP was established in 2007, the 2nd year retention rates for CoE increased from 61% to around 70%. For the last several years, the rate has been fluctuating between 71-76%. FEP continually explores new ways to support freshmen engineering students and increase retention rates. FEP is made up of 90% traditional, first-year students who engage in a two semester Introduction to Engineering course sequence. In addition, FEP supports approximately 80 transfer students who are either transferring from an outside institution or from another College at the University of Arkansas. These students complete the graduation requirements for Introduction to Engineering by enrolling in an 8 week, online, asynchronous Introduction to Engineering Course.

Some research has shown that transfer students may exhibit slightly lower retention rates when compared to their counterparts who begin their collegiate studies at a four-year institution as freshmen. Various factors contribute to transfer students' success, including the challenges associated with adapting to a new campus environment and the potential loss of academic credits during the transfer process. Conversely, alternative studies indicate that transfer students who effectively integrate into their new educational environment, receive appropriate support, and possess well-defined academic and career objectives can achieve similar, if not superior, levels of retention and academic success in comparison to traditional students.

Peer mentoring presents an invaluable opportunity for first-year engineering students to establish a meaningful connection with experienced upperclassmen who can provide guidance on navigating the challenges associated with coursework and the adjustments encountered during the initial year of their engineering studies. This mentorship program yields numerous advantages for the mentees, encompassing academic support, social integration, personal growth, self-assurance, sense of belonging, and cultural awareness—areas where many first-year college students often face difficulties.

The Peer Mentoring Program, established in 2007, has played an important role in enhancing first-year engineering students' retention, preparing them for their sophomore year, and ultimately contributing to improved graduation rates. Each first-year student within the cohort is assigned a dedicated peer mentor who is an upperclassman. The program mandates weekly meetings with these mentors, an integral component of the first-year engineering course, with participation in these sessions contributing to the students' final course grades. This paper explores the extension of the peer mentoring program to transfer students enrolled in an eight-week online Introduction to Engineering Course beginning in the fall of 2023. It summarizes the

benefits gained by these students as participants in the program, shedding light on the potential positive impact of this initiative.

Introduction

The importance of student retention and timely graduation rates in higher education is a critical aspect that significantly influences the success and reputation of higher education institutions. National rankings often consider graduation rates in their assessments. Institutions with high graduation rates are more likely to receive positive rankings, enhancing their national standing and competitiveness [1]. Similarly, institutions with high retention rates are often perceived as providing a supportive and effective learning environment. These successful student outcomes lead to higher levels of student satisfaction, and satisfied students are more likely to contribute positively to an institution's community and serve as advocates for the institution [2]. Additionally, alumni who complete their programs in a timely manner are more likely to maintain connections with their alma mater, contribute to fundraising efforts and provide valuable support to current students [3].

Timely graduation and other academic successes are not universal for all demographics of college students. Transfer students may face unique challenges leading to lower retention rates compared to first-year students who begin their studies at a four-year institution [4]. These challenges include receiving less financial aid [5], experiencing lower levels of engagement [6], and coping with the cultural and academic adjustments that come with transferring [7]. However, research suggests that transfer students can achieve academic success by receiving quality academic advising and support to effectively integrate into their new educational environment [8].

Peer mentoring offers an invaluable opportunity for students to establish a meaningful connection with experienced upper-class students who can provide guidance on navigating the challenges associated with coursework and the adjustments encountered during the initial year of their university studies. These mentorship programs yield numerous advantages for the mentees, encompassing academic support, social integration, personal growth, self-assurance, sense of belonging, and cultural awareness—areas where many first-year college students often face difficulties [9].

The First-Year Engineering Program (FEP) at our institution plays a pivotal role in achieving the College of Engineering's objectives of enhancing student retention and promoting timely graduation rates. FEP is designed to help first year students build a solid foundation for their engineering education. FEP also partners with the Engineering One-Stop Program which oversees student support resources including peer mentoring, academic advising, and academic coaching.

Since its establishment in 2007, FEP has significantly improved the College of Engineering's second-year retention rates, which have risen from 61% to approximately 70%. Over the years, the rates have fluctuated between 71% and 76%, highlighting FEP's commitment to exploring innovative ways to support first-year engineering students and increase retention rates. FEP is made up of predominantly traditional students engaged in a two-semester Introduction to Engineering course sequence. Additionally, FEP supports transfer students, who complete the graduation requirements for Introduction to Engineering through an 8-week, online, asynchronous course. The Peer Mentoring Program for transfer students aims to mitigate some

of the challenges encountered by these students during their transition to the University of Arkansas. This paper explores the benefits gained as a result of participating in the piloted peer mentoring program for transfer students and the impact this extension could have on participants' academic careers.

Methodology

The FEP Peer Mentoring Program, established in 2007, has played a key role in enhancing first-year engineering students' retention, preparing them for their sophomore year, and contributing to improved graduation rates. Each first-year student in the cohort is assigned a dedicated peer mentor, that is an upper-class student. The program mandates weekly meetings with these mentors and is an integral component of the first-year engineering course, with participation in these sessions contributing to the students' final course grades.

Expanding the Peer Mentoring Program to include transfer students necessitates greater flexibility compared to students following the traditional FEP curriculum. Given that the transfer class operates as an asynchronous remote course, adjustments were made to the Transfer Peer Mentoring Program to accommodate both remote and in-person meetings. Existing mentors volunteered to also serve the transfer student population and were matched with mentees based on declared major and meeting preference (i.e., in-person vs. virtual). Instead of providing predetermined topics, mentors adopted a more personalized approach tailored to the transfer mentees' previous experiences. Mentors were instructed to engage transfer mentees in discussions about their specific mentoring objectives, shaping conversations accordingly to address individual needs.

At the end of the Fall of 2023 semester, surveys were distributed to mentors and mentees involved in the Transfer Peer Mentoring Program. These surveys aimed to gather insights into their experiences and their satisfaction with the mentorship, assess the effectiveness of the mentorship format, and gather suggestions for improvement and future recommendations. The survey questions were designed to collect data that would inform program development, enhance student engagement within the College, and provide the necessary support for student success. Participation in the survey was voluntary.

For mentees, the questionnaire focused on various aspects of the mentorship experience, including satisfaction levels, meeting formats and frequencies, preferences for engagement, continuity beyond the initial 6 weeks, ease of communication, comfort levels, mentor engagement, knowledge acquisition, assistance with transitioning to college or engineering, identifying positives and negatives, desired additional resources, potential improvements, recommendations for future students, rationale behind recommendations, opinions on mentoring as a course component, and feedback regarding the mentor.

The mentors' questionnaire cover topics such as the mentors' experience with traditional or transfer students, their satisfaction with the mentorship program, their goals for mentoring, the effectiveness of different communication methods, preferences for meeting frequency and group settings, enjoyment of the mentoring role, desires for extending the mentorship period, ease of meeting with mentees, perceptions of mentee comfort and interest, impact on mentees' knowledge and transition to college, positives and negatives of the experience, suggestions for additional resources, improvements to the mentorship program, recommendations for future students, opinions on mentoring as part of the course, and feedback about their mentees.

Results and Discussion

During Fall 2023, 65 mentors and 80 transfer students participated in the pilot Transfer Peer Mentoring Program. 44.6% of mentors and 63.8% of mentees completed the post-program survey. Of the students who participated in the program and completed the survey, 11 started in a different college at the University of Arkansas, but later changed their major to Engineering, 36 transferred to the University of Arkansas after starting at a different university or college, and four were currently students at a different college but enrolled in the Introduction to Engineering course as part of a STEM prep program. Of the mentors who participated in the piloted program, 90% were traditional students who took the Introduction to Engineering Course sequence their first year of college. Two mentors had started in a different college at the University of Arkansas, but later changed their major to Engineering, and one mentor transferred to the University of Arkansas after starting at a different university or college.

Introduction to Engineering

This introductory course for undergraduates introduces the fields of engineering and many of the modeling and problem-solving techniques used by engineers and computer scientists. It also introduces the students to the engineering profession and some of the computer tools necessary for pursuing a degree. All students in this course are transfer engineering students or STEM Prep students. This course is required for graduation with a degree in any of the engineering fields or computer science.

The curriculum encompasses a spectrum of foundational topics including conventions for number writing and the handling of significant figures, alongside comprehensive treatment of unit conversions and dimensional analysis. Additionally, the course teaches practical Excel skills, including techniques such as data sorting, filtering, and basic statistical computation, as well as the creation of charts and graphs.

Furthermore, students are introduced to logical functions for data analysis, and are equipped with the tools of goal seek and solver for the analysis of linear optimization challenges. Complementary to these technical competencies, the course also addresses a suite of soft skills, including an introduction to artificial intelligence and navigation of library resources with emphasis on academic integrity, plagiarism avoidance, utilization of peer-reviewed materials, and proper citation practices. Additionally, it provides guidance on career development tools such as resume refinement and interview skills.

A key aspect of the course entails completing an engineering project utilizing Arduino simulations in TinkerCad. The course differs from traditional team-based projects by focusing on individual project completion and reducing the emphasis on project-based learning time.

Participant Feedback- Mentee Perspective

Overall, the mentees had a positive experience with the Transfer Peer Mentoring Program, where 92% of respondents rated their overall experiences as good or excellent, 76% felt that having a mentor helped with their transition to the College of Engineering, and 92% felt that future transfer students should participate in the program (Figure 1). Most of the student participants liked the program format and the flexibility of connecting with their mentor remotely (virtual, text, call) and in-person. Most students also liked that the meetings were 1:1 so that they could build a relationship with their mentor, and 94% said they felt comfortable talking with their

mentor. However, 35% of participants would have enjoyed at least some group meetings so that they could build connections with other students.

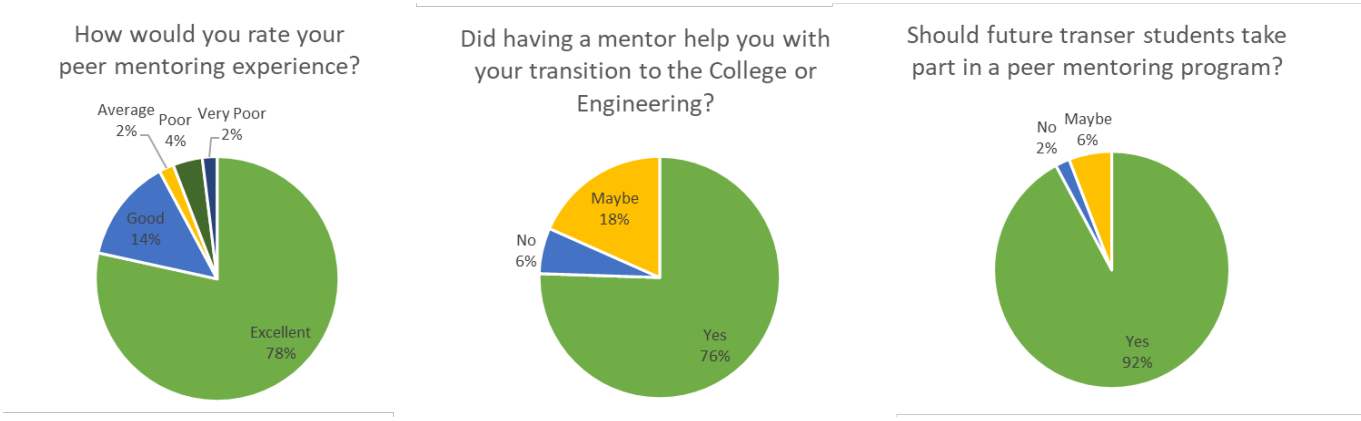

Figure 1. Feedback from participants in the Fall 2023 Transfer Peer Mentoring Program, from the mentees' point of view.

In summary, 84% of participants reported enjoying their mentorship experience and gaining valuable knowledge and insights through mentor meetings. Many mentees appreciated having someone familiar with campus culture, finding it beneficial. One mentee emphasized the value of hearing from someone who had followed a similar academic path, noting, "It is what you make it, but having guidance from someone who has gone through the same experiences can be very useful." Some mentees utilized the program for academic support, with one mentioning, "It teaches you responsibility and foundational concepts in engineering, which have been beneficial in other classes like Physics and Calculus." Others found social benefits, with one mentee expressing, "I liked having a friend in Bioengineering who has taken similar courses." Overall, most participants felt that the program achieved its intended goals during the pilot phase.

Participant Feedback- Mentor Perspective

Overall, the mentors also had a positive experience with the Transfer Peer Mentoring Program where 69% of respondents rated their overall experiences as good or excellent. However, compared to the mentees, fewer mentors (41%) felt like they helped ease their students transition to the College of Engineering. Regardless, the majority (72%) still felt that future transfer students should take part in the peer mentoring program (Figure 2). The mentors did have varying opinions on how the program should be offered and whether it should be required. 38% of mentors felt the program should continue to run as piloted where the transfer student's participation in the program made up ~10% of their grade in their Introduction to Engineering course. 41% felt the program should be run as part of the class, but the program should be optional, and participants should receive bonus points toward their grade for participating. Others (3%) felt it should be structured to be part of the class but should not count toward their grade, and 3% felt that peer mentoring should be made available for transfer students, but it should not be associated with the Introduction to Engineering course.

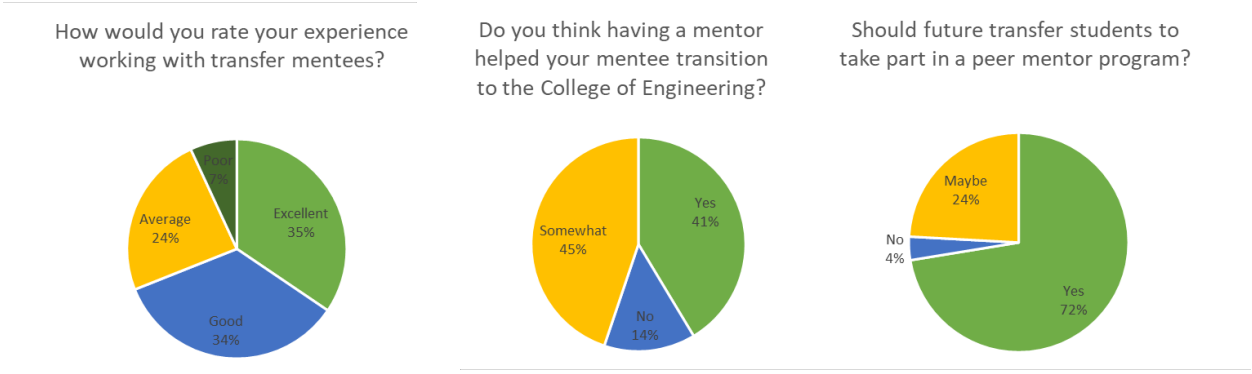

Figure 2. Feedback from participants in the Fall 2023 Transfer Peer Mentoring Program, from the mentors' point of view.

Several mentors expressed feelings of ineffectiveness in their roles due to the non-traditional status of many transfer students. They encountered difficulties in establishing rapport with certain mentees, primarily stemming from age disparities or dissimilar academic backgrounds. For instance, one mentor experienced that both of their assigned mentees were older and had already started mechanical engineering coursework, rendering the mentorship seemingly unnecessary. Another mentor highlighted that transfer mentees often brought substantial prior experience, making the mentorship meetings less impactful, and suggested a need to reconsider the frequency of meetings. Other mentors felt like they did not have all the knowledge needed to fully help their mentees. For example, one mentor commented “Because I was not a transfer student, I was unsure of how to answer some of her questions. It was difficult to give advice to her because I am not sure how the process works when you're a transfer student. Sometimes, I would start telling her something and then realize she doesn't need that information. Such as recommendations for classes that she already had transfer credit for.” Not all mentors struggled to find common ground. Another mentor commented "even if we can’t relate through academics, we still could relate on personal matters and preferences; humans are social creatures and like to share their interests." Regardless of the experience, these mentors proposed that such mentees would get greater value from guidance related to professional development, including aspects like career fairs, scholarship opportunities, and peer networking initiatives.

Conclusions

The feedback from surveyed mentees indicates a positive perception of the program's utility. The majority grasp the fundamental rationale behind the mentoring initiative and its potential benefits. Their expectations aligned closely with their actual experiences.

Conversely, mentors, due to their insight into the program's inner workings, encountered challenges disassociating from the conventional mentorship approach. Unlike the traditional model, which furnishes mentors with structured weekly topics and conversation guides referred to as "scripts," the piloted program for transfer mentees lacked prescribed frameworks. Several respondents expressed a desire for these scripted tools to aid in facilitating interactions with transfer mentees. One respondent highlighted feeling ill-equipped due to not being a transfer student, underscoring the need for more inclusive resources. However, the absence of weekly scripts in the pilot program stemmed from two primary considerations. Firstly, insufficient data on transfer students' needs and preferences warranted a more exploratory approach. Secondly, a

belief that scripted interactions might impede authentic engagement and potentially overlook the diverse experiences transfer students bring necessitated an open-ended method.

In response to mentor feedback and survey findings, the program's leadership council, known as Lead Mentors, have been tasked with exploring the development of scripted frameworks while prioritizing genuine connections. The aim is to refine the program, equipping mentors to guide conversations effectively while allowing mentees to share their backgrounds and navigate their transition to the University of Arkansas and the College of Engineering seamlessly.

Further development of this project will entail an examination of potential demographic influences on student and mentor perceptions, alongside an analysis of both in-person and virtual meeting environments.

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