

Work In Progress: Engineering Success Bridge Program: Creating Sense of Belonging through Campus and Industry Supported Summer Bridge Program

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Victor Alonso Bradford currently serves as the Director of First Year Engineering (FYE) and Chapter Advisor for the Society of Hispanic Professional Engineers at the University of Missouri – College of Engineering (Mizzou). As a first-generation college graduate, Victor is committed to bringing STEM awareness and access to all who are interested. He has made a career in providing access to students and supporting them to achieve their higher education goals. He is fortunate to work alongside some of the greatest students, faculty, and staff that the world has to offer. He counts his blessings each day knowing he gets to play a small role in students achieving their academic goals.

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Dr. Tojan Rahhal is an Adjunct Professor in the Biomedical, Biological, and Chemical Engineering Department and the Assistant Dean for Inclusive Excellence and Strategic Initiatives at the University of Missouri-Columbia in the College of Engineering. Rahhal graduated from North Carolina State University with a BS in Biomedical Engineering. She went on to pursue a PhD in Pharmaceutical Sciences at the University of North Carolina at Chapel Hill (UNC-Ch), working in the lab of Dr. Joseph M. DeSimone. Outside of her research efforts, she demonstrated commitment to service and leadership in the academic community, promoting awareness of issues regarding equality in science. She currently owns Alliance Professional Development (www.Alliance-Professional.com) where she works on providing customized workshops focusing on leadership, soft skills, and cultural awareness for companies and organizations. At MU she focuses on facilitating outreach, recruitment, retention, and overall success for all members of our community, especially those from backgrounds traditionally underrepresented in engineering.

Dr. Hani Salim P.E., University of Missouri - Columbia

Dr. Salim is a professor of Civil Engineering and served at the associate dean for academic programs and student success at the college of engineering between 2015 and 2019. Through a collaboration with the provost office, the engineering summer bridge programs was developed to improve the educational experience and retention of incoming engineering students.

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Introduction

This work-in-progress paper will highlight the creation and expansion of the Mizzou Engineering Success Bridge Program (ESBP), a no-cost summer transition program for incoming freshmen at the University of Missouri-Columbia (MU) that has grown from a week-long to a month-long program that brings campus and industry professionals together to serve engineering's most at-risk population. The work-in-progress paper will also demonstrate how MU plans to transition ESBP to a two-week online format in light of the COVID-19 pandemic.

ESBP was organized by the First Year Engineering (FYE) Office, which serves to provide all new undergraduate students with the resources, opportunities and connections to smoothly transition to Mizzou Engineering, but also jumpstart their future careers. This retention initiative originated in Spring 2018 with financial support from MU's Provost Office, and has since evolved into a successful FYE Office consisting of a FYE director, academic advisors and two graduate students. Through FYE strategies, students experience more individualized advising and follow-up, an exploration of their majors, participation in student success programs, and a better sense of community within the College of Engineering (COE) and MU.

Following higher education's best retention practices on student's Sense of Belonging, Mizzou Engineering hosted 45 engineering freshmen in a one-week transition program before the start of their freshmen year in August 2018. The program offered students a glimpse of what their freshmen year would look like. Students took crash courses over Chemistry I, Pre-Calculus, and a Student Success Seminar. Students participated in hands on activities for all areas of engineering and learned about the 10 different majors within the college. This program was designed to give them an idea of what the semester would be like. The target participants for the camp were incoming Pre-Engineering students, who had not met COE's direct admission criteria. Historically these students had significantly lower retention and graduation rates than students who met the college's admission requirements.

Continuing the success of the 2018 program, ESBP expanded to four weeks in July 2019 hosting forty incoming freshmen. This goal of this paper is to provide attendees with the framework to implement a similar bridge program at their institutions. Additionally, the paper will demonstrate how this initiative has helped COE reach its highest retention rates in recent years.

Program Approach

The aim of ESBP is to assist incoming freshmen with the transition to MU and the COE by introducing students to resources and opportunities available to them. The goal is accomplish by introducing students to campus leadership, offering courses before the start of their freshmen year, building community, major & career exploration, and an engineering design competition.

From the beginning the ESBP has had three guiding principles – Academic Preparedness, Career Exploration, and Community Building.

Academic Preparedness

The bridge program connects students with a support system that they can access once they are on campus in the fall. ESBP aims to introduce students to a wide variety of faculty and staff at MU which students can lean on if they have any questions or concerns throughout their academic career. Students also benefit from building relationships with faculty and breaking down any preconceived notions they may have had about them.

The ESBP partners with the MU Communication Department to deliver a one-of-a-kind public speaking experience to our engineering students. The COE identified public speaking as a necessary skill for our students to be successful in the future. The COE worked with department chair to modify the public speaking curriculum that would address topics related to engineering and could be delivered in a 4-week format for credit. Additionally, the final for the course was based on a presentation of the student’s Rube Goldberg design project tying it all together

The ESBP also exposes students to courses and materials that they will see in engineering. Participants receive two-week crash courses with faculty from our Chemistry and Math departments. In the two-week crash course, faculty review material, quiz students, host lab sessions, and administer an exam. The courses move very quickly, but allowed the students to understand the transition that will occur from high school to college. In addition to these courses, students participate in a Student Success Seminar with the FYE director. This course provides useful tools, discussion and engagement opportunities for major and career exploration, and opportunity to learn about and adopt methods that promotes success in college and in life.

Career Exploration

One of COE’s four Pillars of Pursuit is Educating Engineering Leaders. The college believes that growing the next generation of engineers, starts by developing them now as students. The ESBP aim is to expose students to not just engineering concepts, but engineering experiences. Throughout the program students explored the 10 majors that Mizzou Engineering has to offer through department presentations, industry presentations and company site visits. The FYE office collaborates with the COE Leadership, Engagement, and Career Development Academy to connect students to different industry professionals. Table 1 shows a few of the experiences students had in regards to major and career exploration.

Table 1. Fall 2019 ESBP company site visits and industry presentations

Company Site Visits	Industry Presentations
PepsiCo Quaker Oats	BlueScope Buildings North American
Spartan Light Metals	Shelter Insurance
Veteran’s United Home Loans	Keurig Dr. Pepper
Aurora Organic Dairy	Cerner
MU Research Reactor	

Community Building

Best retention practices state that students who form a strong sense of community early in their academic career tend to retain and persist at a higher rate than those who do not. As a primary goal of the ESBP, the college aims to build that community through a wide variety of programming, including team building events, collaborative engineering design project, and a learning community. Students are divided into four groups of 10 that are led by current engineering students. These cohorts live, work, and complete an engineering design competition together. By intentionally clustering students into groups, they are able to form strong friendships in the program, which they are able to continue through their freshmen year. Other community building events include high ropes course, 4th of July dinner & parade, Engineering 101: Real Talk, and movie & arcade nights. The sense of community continues through their freshmen year as we provide programming throughout the year to bring the groups together; such as new student tailgate, ESBP brunches, and zoom hangouts.

Results and Discussion

The FYE Office has seen tremendous success with ESBP. The 2018 one-week ESBP achieved a 71.1% one-year retention rate within COE compared to 63.2% of Pre-Engineering students who did not attend as shown in Figure 1a. The 2019 ESBP experienced a 92.5% 1-semester retention rate within COE compared to 83.4% of non-ESBP pre-engineering students as seen in Figure 1b. A 2019 participant said “ESBP was just an incredible program. The ability to make new friends, have connections with companies, visit work sites, and meet engineering leaders is priceless.”

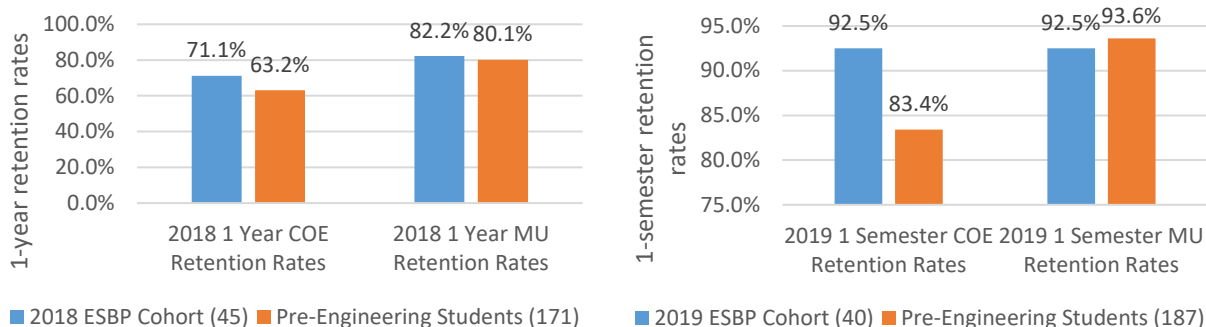


Figure 1. 2018 cohort 1-year retention rates within COE and MU (a) & 2019 cohort 1st semester retention rates within COE and MU (b)

Due to the COVID-19 pandemic, MU moved all summer 2020 programming online. As ESBP has always been in-person, the FYE Office made the decision to transform its month-long program to a two-week long program in July 2020. The new, shorter format will still aim to meet the same objectives of community building, academic preparations, and career exploration. Participants will receive a shortened Chemistry, Math, Student Success Seminar, and Public Speaking curriculum in the morning. In the afternoons, ESBP will highlight each engineering major with faculty presentation, demos by student organizations and industry connections related to careers for the various majors. ESBP will still follow a cohort model and the FYE Office will provide follow-up programming when students arrive on campus in fall 2020.