

# **Managing the Challenges of Recruiting and Supporting S-STEM Scholars at Three Partnering Community Colleges During a Pandemic**

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In January 2020, an S-STEM grant (Grant #1930497) was awarded to East Carolina University (Greenville, NC) in partnership with three local community colleges. The community college partners were selected to participate in this program based upon their geographic proximity to the university and their offering an Associate's in Engineering degree program. The purpose of this program was to support low-income students through scholarships and programming designed to help the community college students feel welcomed and part of the engineering program at the university before they transfer to the university. The project intended to recruit 80 total scholars in two cohorts of 40. Each cohort was to be comprised of 20 university students and 20 community college students. In-person recruiting events were planned in the service areas of each of the community colleges and in a 10-county region surrounding the university. The original plan for programming was to offer special events and speakers on each campus throughout the academic year so that all of the scholars could meet each other and learn more about the engineering profession. When events were held on the university campus, the goal was to showcase the laboratories and programs available once students complete their associate's degree and transfer and for them to begin developing relationships with the engineering faculty at the university. When events were held on the community college campuses, the goal was for the university students to learn more about the engineering programs at each of the community colleges and to develop relationships with the community college students. The global pandemic required significant pivoting from the original plan for activities and recruitment of students. This paper outlines the recruitment and retention of S-STEM scholars at the three partnering community colleges. In particular, this paper will discuss the three very different approaches each community college took to offering classes and activities on campus during the Covid-19 pandemic and how that impacted course offerings and program implementation. This works in progress paper outlines the activities done to this point in the project and the plans for future years.

### **Program Overview**

East Carolina University (ECU) serves a region of North Carolina that contains many low-income families. The poverty rate in Pitt County (home to ECU) is 17.1%. Additionally, 6 more counties within an hour's drive of ECU have poverty rates in excess of 20%[1]. The goal of this S-STEM program was to recruit, retain, and graduate engineering students from these areas in hopes of improving the economic outcomes of students in this region and helping to fill the technical jobs available at businesses throughout the region that often have difficulty attracting and retaining talent. Faculty in the Department of Engineering at ECU noticed an increasing number of transfer students enrolling in the BS in Engineering degree program in recent years. It was also observed that many students dropped out of the engineering program before completing the first 2 years of their degree, but if students persisted through to a third year, most students graduated. This S-STEM program was designed with support for both students who start their pursuit and an engineering degree at ECU and those who start at three partnering community colleges in the area.

This program provides scholarships valued at up to \$10,000 per year for university students and up to \$3,000 per year for community college students. If community college students transfer to the university, they are then eligible for the same scholarship amount as other university students. Scholarship values were based upon the total cost of attendance at each institution and the expected family contribution as determined by the FAFSA. Additionally, the S-STEM grant funds the establishment of a textbook lending library on each participating campus, the development of a faculty mentoring program and a peer mentoring program, team building activities, and events designed to foster career readiness and professional development. A major component of the program is the opportunity for community college and university students in engineering to interact because those students will be part of the same graduating classes and often transfer students have difficulty building relationships with other students upon transfer. Transfer students often do not have the opportunities to participate in high impact practices (HIPs) such as living-learning communities and other first-year program initiatives[2]. Transfer students also often have limited opportunities to engage with university faculty which may limit their opportunities to engage in student organizations and undergraduate research.

### **Student Recruitment**

At the beginning of the grant period, recruitment was going as planned. The PI from ECU and Co-PIs from the community colleges scheduled in-person recruiting events and presentations throughout the targeted ten county region. Community colleges in North Carolina are limited in the areas in which they can recruit, so specific community colleges presented within their service areas. Due to the enrollment period going much later for the community colleges than at the university, it was planned to continue recruiting for the community college cohort through the spring of 2020. As has been well-documented, in March of 2020 the global Covid-19 pandemic forced the shutdown of many things including in-person education at most schools. All classes at ECU were pivoted online as were all classes in the public schools in the surrounding area. The spring open house event at ECU was cancelled. This made it impossible to continue in-person recruiting in the public schools or other regional recruiting events. The PI team had to work to shift recruiting efforts online to platforms such as Microsoft Teams and Zoom in order to continue to disseminate information about the program.

At ECU, all students who applied to the BS in Engineering program were invited to apply for the scholarship. The deadline for applications was in March, giving time for the selection committee to review all applications well in advance of the fall semester. At the community colleges, however, the deadline to enroll is much later and in some cases just a day before classes begin. This made it very difficult to determine which new community college students were pursuing degrees in engineering and to encourage applicants to submit a scholarship application before the Fall 2020 semester began. Of the three partnering community colleges, only one had selected scholars prior to the start of the Fall 2020 semester and the others did not have any applicants, despite advertising the program throughout multiple in-person and online recruiting events.

One further challenge to enrolling students in the S-STEM scholarship program at the community colleges was that the program is only available to students with significant financial need. Some students who applied simply had too high of an expected family contribution and

were ineligible to receive scholarships. Some of the lowest-income students were eligible for Pell Grants and in many cases those Pell Grants covered the entire cost of attending community college. Students who were eligible for Pell Grants often did not apply for the scholarship even though it could significantly benefit them upon transfer to the university when the total cost of attendance would be higher than the value of their Pell Grant.

Based upon historical and projected enrollments in the Associate's in Engineering degree program, the scholarships in each cohort were allotted with 10 in each cohort for Pitt Community College (PCC) and 5 each for Lenoir Community College (LCC) and Wayne Community College (WCC). As of the Spring 2022 semester, PCC has enrolled 14 scholars, LCC has enrolled 3 scholars, and WCC has enrolled 4 scholars.

### **A Tsunami Effect of Admissions and Enrollment**

Given the uncertainty regarding how the 2020-21 academic year would go after nearly every school (K-12 and College/University) in the United States pivoted to online instruction in Spring 2021, many universities and community colleges were having a difficult time attracting students. The largest engineering program in North Carolina (NC State University) is usually very selective and denies many students who often enroll instead at ECU. ECU also often denies students admission and many of those students in a typical year will enroll in a community college. The admissions cycle for the Fall 2020 term was unusual with many students deciding to sit out and that impacted the ability of NC State to be as selective as they usually have been and maintain enrollment numbers. This resulted in some late round admissions to NC State and in turn some students who were formerly committed to attend ECU declining admissions offers. This then forced ECU to recruit more students to maintain enrollments and thus many students who normally would have enrolled at community colleges were now enrolling in universities. This was particularly impactful on Associate's in Engineering programs and their ability to recruit students for the scholarship, because the hope was that students in the program would all start in at least calculus 1 to be on track to graduate in 4 years and many of the students at the community colleges were not able to be placed into calculus.

### **Faculty Turnover**

One challenge this project has faced has been the turnover of faculty affiliated with the engineering programs at the partnering institutions. When the proposal was submitted, a Co-PI or senior personnel was identified at each partnering institution. The Co-PI at PCC is a physics instructor who helped to create the Associate's in Engineering (AE) degree that is offered at multiple community colleges throughout North Carolina. He also was a past president of the NC pathways program, a group of 2-year and 4-year schools in North Carolina offering engineering classes to help align the curriculum. PCC also had an engineering instructor who taught most of the engineering classes in the AE curriculum. This instructor was a retired engineer with many years of professional practice. At LCC the senior personnel when the proposal was submitted was a math instructor who helped coordinate the AE program. This instructor was a former student of the Co-PI at PCC and had transferred to another university to get an engineering degree. LCC taught the required math, science, humanities, and social science courses for the AE

program, but mostly relied on PCC or WCC for their students to take engineering courses. When the proposal was submitted, the Co-PI at WCC was an alumnus of ECU's BS in Engineering degree program who as a student was an S-STEM scholarship recipient.

From the time the proposal was submitted until it was funded, the senior person at LCC moved into an administrative role and was no longer affiliated with the AE program. The Co-PI at WCC left his position to take a teaching role at another community college. This required the community college partners to identify a new senior person/Co-PI to implement the program who was not involved in the many discussions the PI team had when developing the proposal. In January 2020 a new engineering instructor was hired at WCC and this person was brought into the project as a Co-PI just as the project was starting. At LCC, the senior person role was transitioned to another math instructor who had already been at the CC for over 15 years. This brought in a new partner with longstanding institutional knowledge, but required some training to get the new partner up to speed with project logistics and the associates in engineering program. At the end of the Fall 2020 semester, the engineering instructor at PCC retired and a new engineering instructor was hired to replace him starting in Spring 2021. This new engineering instructor was an alumnus of the ECU engineering program having earned both a BS in Engineering and MS in Biomedical Engineering at ECU, so this helped with continuity. Unfortunately, after just one year, the new engineering instructor at PCC resigned at the end of the Fall 2021 semester to take a higher-paying position in industry. Around the same time, the new engineering instructor at WCC also resigned to take a higher-paying position in another state. There currently is no engineering instructor at any of the partnering community colleges, which posed a challenge in the Spring 2022 semester in offering all of the needed courses for the Associates in Engineering program and as of May 2022 there still is no new engineering instructor hired to replace either faculty member at PCC or WCC for the Fall 2022 semester.

### **Varying Responses to the Pandemic**

One of the original intentions of the project was to develop peer groups across the institutions with students mostly enrolled in the same coursework regardless of institution. This proved to be a challenge due to the Covid-19 pandemic. At PCC, the only classes allowed to meet on campus during the Fall 2020 semester were science labs and other practical courses such as construction. Engineering courses were not allowed to meet on campus, nor were most of the other courses required for the AE including English, math, social science, and humanities electives. At LCC, classes continued to meet in person on campus, but each classroom, regardless of size, had a modified capacity of only 10 people. Even if a class had an enrollment in excess of 9 students, once 10 people were in a classroom (9 students and the instructor), any more students intending to come to class were turned away from the classroom and sent to the library to watch the class online. At WCC classes continued to be offered face-to-face. At ECU, classes started face-to-face in Fall 2020 and the university administration restructured the academic calendar to split the fall semester into 2 blocks such that students would only take half of their classes in each block, but the pace of instructor was doubled compared to the usual semester-long schedule. Students were allowed to live on campus in the residence halls. Unfortunately, after just 2 weeks of in-person instruction, university officials announced that instruction must pivot to an online format

for the remainder of the semester and most students moved out of their dorms and back to their hometowns to live with their families.

This varying response to the pandemic across the partnering campuses made it very difficult to implement some of the program activities. In-person student gatherings were discouraged or in some cases forbidden. Given that many students had moved back to their hometowns, even if permitted the travel logistics would have made it difficult for students to attend. Many of our industrial partners also did not allow outside visitors, which made it a challenge to plan site visits to expose students to industrial opportunities.

The varying responses to the pandemic and the uncertainty of how learning may be impacted as the pandemic evolved impacted students decisions to attend college in the 2020-21 academic year. Some students realized during the pivot to online instruction in Spring 2020 that they just did not want to pay tuition to take classes online and decided that they would wait to take classes until all classes were available face-to-face. This was one factor impacting a decreased enrollment overall at the community colleges and the university.

### **Collaborative Advising**

One of the initiatives supported by the project was hiring 3 graduate assistants (GAs) to serve as advising liaisons between ECU and each of the community college partners. The goal was for the graduate students to learn enough about the BS in Engineering curriculum at the university and the Associates in Engineering course offerings at each of the community colleges to help advise students planning to transfer from the community college to ECU. Three graduate students were hired for this purpose and they were trained by the PI about the engineering curriculum. They also were introduced to the community college partners. Unfortunately, since 2 of the partnering community colleges did not have scholars in the program at the start of the fall 2020 semester, it made it difficult for the GAs to work with students. Further, due to campus restrictions at both the university and community college partners, the GAs were not allowed to travel to the CC campuses and worked the entire academic year remotely. This made it difficult to develop relationships with students. The GAs were involved in some other outreach and recruiting events, but the intention of involving them in helping students plan their course schedule did not come to fruition due to logistical limitations.

### **Cohort Activities**

In the Fall 2021 semester, Covid restrictions were relaxed at all partnering institutions. This allowed for more collaborative activities. A special welcome dinner for new scholars was held in August 2021 at ECU and all community college scholars were invited to have dinner with the new scholars in the second cohort at the university. Ice breakers kicked off the event to allow students the chance to get to know one another. The students then ate a catered meal together. The Dean and Engineering Department head from ECU attended and offered words of encouragement and welcome to the students. After dinner the community college students went

on lab tours to learn about the hands-on learning facilities at the university and the university students prepared for more team building events held on campus throughout the rest of the week.

In November 2021, another joint activity was held at LCC. Students built and launched model rockets and sensors were installed in the rockets to track elevation and acceleration. A career speaker was invited to present the work done at a local prosthetics company.

Another collaborative scholar event was held in February 2022 at PCC featuring Arduino robot programming and a design contest for teams of students to program a sumo robot to stay inside of a ring while trying to get an opposing team's robot out of the ring. At this event two career speakers presented opportunities at local companies including one that builds pressure vessels and another that does pharmaceutical manufacturing. Students had the opportunity to have their resumes critiqued and to engage in mock interviews with professionals from the industry partners in attendance to prepare them for careers.

### **Transfer and Attrition**

Based upon the original timeline in the grant proposal, it was expected that the first cohort of scholars would enroll at the community colleges in Fall 2020 and would transfer to ECU for the Fall 2022 semester. Thus far two of the selected community college scholars have fully transferred to ECU having completed enough of their classes at the community college to be eligible to complete their associate's degree and transfer earlier than anticipated. Three other scholars enrolled in classes both at PCC and ECU in Spring 2022 in order to take what is available at the community college under lower cost tuition while also enrolling in specific classes at the university that must be taken in the second semester of the sophomore year in order to not delay graduation beyond 4 years from initial enrollment. Two of these students are expected to continue full time enrollment at ECU while another student accepted a scholarship offer to attend another university this fall.

In addition to the three scholars from PCC who dual enrolled at PCC and ECU, three more scholars are making good progress in the AE program at PCC and should transfer in the next year to ECU. Four more scholars at PCC had some academic difficulty and are still being supported, but in a probationary period to try to get them stronger support to succeed academically. Four of the scholars who were supported for at least one academic term at PCC have left the program due to either a major change or academic difficulty. Three students at LCC were supported through the 2021-22 academic year; of those three, two are still on track in the Associates in Engineering program at LCC and are anticipated to transfer to ECU over the next year or two. At WCC, two students are still currently supported by the scholarship. One student has lost the scholarship due to poor academic performance in engineering calculus and is currently only taking calculus to try to successfully get back on track in the AE program. A student previously supported by the scholarship program at WCC has already transferred to ECU and another scholar is matriculating to ECU for the Fall 2022 semester.

In order to replace students who have transferred early or left the program, additional scholars are being recruited and should start in Fall 2022.

## **Conclusion**

The first two years of a multi-institutional S-STEM project have been a rewarding experience of identifying and supporting students. Many lessons have been learned about how to recruit and retain students. There have been significant challenges throughout the project including the Covid-19 pandemic significantly changing how courses and other programs could be delivered. The loss of instructional personnel has posed a challenge to recruiting and retaining scholars and providing consistent academic programming for enrolled students. Despite the challenges, many of the students who are supported by the program seem to be thriving and may not have considered getting an engineering degree without the support this grant provides.

## **Acknowledgement**

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## **References**

- [1] Index Mundi (2022) North Carolina Poverty Rate by County. Available from <https://www.indexmundi.com/facts/united-states/quick-facts/north-carolina/percent-of-people-of-all-ages-in-poverty#map>.
- [2] Zilvinskis, J., & Dumford, A. D. (2018). The Relationship Between Transfer Student Status, Student Engagement, and High-Impact Practice Participation. *Community College Review*, 46(4), 368–387. <https://doi.org/10.1177/0091552118781495>