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Work-in-Progress: Addressing Recruitment Issues with Potential Transfer Students from State Technical Colleges

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In this work-in-progress paper, we present emergent recruitment issues encountered during an ongoing design-based project with participants from two-year colleges for an NSF-funded scholarship program. Our hope is to connect with researchers who have previously explored similar issues or may experience them in their current work. *Student Pathways in Engineering and Computing for Transfer Students* (SPECTRA) is an NSF S-STEM program that provides financial assistance to students transferring from the South Carolina Technical College System into Engineering or Computing majors at Clemson University [1]. SPECTRA also assists students by connecting them with peers at the technical colleges who move together through the transfer process to Clemson and are supported by the SPECTRA program until graduation. In addition to exploring the experiences of current SPECTRA participants, we investigate how the project can be scaled to include more students and sustained after NSF support ends.

The 2021-2022 academic year is the third of the five-year program, although, given emergent recruitment issues, we foresee application for a no-cost extension. The primary concern is the low number of students currently supported in comparison to our goals, highlighting recruitment for further examination. We planned to support up to twenty students in year 1, 52 students in year 2, and 70 students in year 3, but our actual numbers in the first three years are 7, 12, and 28 students. Given this trend, our concern over how we recruit students into SPECTRA is now at the forefront of our work. The program is not reaching eligible students, and low recruitment has limited the quality of research needed to inform the construction of a sustainable program. We have added interviews with potential students at the technical colleges to explore recruitment. In addition to this interview process, we have reviewed our internal practices, analyzed existing public information and social media from similar programs, and reviewed existing literature from related research and practice.

We identified aspects that may have impacted our current situation. The first was explicit, being the impact of COVID-19 on our ability to hold in-person recruitment events. Similar to studies that have identified other COVID-19 impacts on two-year institutions, such as “retention rates declined the most in the community college sector (-2.1 pp to 51.6%)” [2], “disparities in upward transfer mobility increased during the pandemic year” [3], and community colleges being hit hardest “with a 9.4 percent decline” in enrollment [4], we intend to further clarify the influence of COVID-19 on our context. COVID-19 also played a role with regard to the need for scholarship funds, as one of the technical colleges in our program used federal relief funds to provide free tuition for all students during the 2020-2021 academic year. Another potential impact is the effectiveness of the SPECTRA webpages and other online materials to meet the needs of potential students considering the program. In this work-in-progress paper, we share how we address recruitment issues and how new interventions impact recruitment.

Background

One of the pathways through which undergraduates may achieve a bachelor's degree is by starting at the community college level. A factor for many students is that tuition of a community college is significantly less than that of a four-year university [5],[6]. Without a scholarship, the

cost of attendance at four-year institutions may be unachievable for low-income students. Additionally, students who start at community colleges are more likely to have additional responsibilities (e.g., jobs or family matters) that require them to have a flexible schedule and stay near their homes [7]. Local community colleges provide students with the opportunity to progress towards a degree while also maintaining a work and family balance. Community college students are also able to participate in multiple introductory level classes while having fewer classmates, allowing the opportunity to explore without paying the price of high tuition and less individualized attention they may experience at a university [7],[8]. Those students who achieve an associate degree before their transfer are more likely to succeed in their new program than those who do not [9].

For many transfer students pursuing engineering, community college is one step toward their goals. These transfer students may run into difficulties through, and even after, the transfer process that may hinder their experience and success. One problem that transfer students face is having little to no social support at their new campus [8],[10],[11], which may partially be due to coming into engineering programs without a cohort of new students, a time when many students build connections and friendships. Transfer students, in particular, may also be first-generation students and not have the social capital that their peers have [12], social capital being the contacts and access to knowledge about college and its processes. Transfers also tend to have additional outside commitments, such as jobs and families, that make it difficult to build a strong social foundation on campus while also doing coursework [6],[13]. Financial strains may require transfer students to work strenuous jobs to be able to afford the cost of attendance at their four-year degree program [10].

Some students join engineering due to their enjoyment of mathematics and science at their initial institution. Unfortunately, relying solely on a strong math and science background may not prepare transfer students for an engineering degree program, and the unexpected struggles they may face can lead them to drop out [11]. Realization of the program's difficulty can be compounded with a common transfer experience known as “transfer shock.” Transfer shock occurs when students experience a transitory decline in GPA as they move from one institution to another [9]. GPA may be impacted by many factors, including a change in how coursework is taught and graded in the transfer’s new program [10],[11]. In some cases, the drop in GPA may be enough to cause students to rethink their choice to transfer, and they may choose to drop the program or even the university as a whole [14]. In one study, the authors found that transfer students were more likely to leave their college or university when they drop a program than non-transfers who may simply transition from one program to another [8].

As the struggles of transfer students are well studied and fairly common, many programs and universities have constructed programs and research groups to assist transfer students in being successful and graduating (this is particularly true of STEM programs) [8],[15],[16],[17],[18]. These programs and learning communities have been fairly successful, and students who participate are more likely to graduate [8] and are more likely to have a positive college experience [17]. Within these programs and studies, there are several common themes and experiences that seem to have the greatest impact on transfer student success. Among these are exposing transfer students to research opportunities [5],[17], providing a stipend or scholarship

[6],[18], building connections with faculty members [5],[8],[14],[11], and creating a sense of community [5],[11],[13],[19].

The Student Pathways in Engineering and Computing for Transfer Students (SPECTRA) program is similar to these previous programs in that it aims to assist low-income transfer students as they move from their community college into a four-year degree program. SPECTRA, in particular, is funded by NSF S-STEM and works with the students in the South Carolina Technical College System. SPECTRA assists these transfer students as they transition into Engineering or Computing majors at Clemson University.

Program Description

The purpose of the SPECTRA program is to assist low-income students in South Carolina technical schools in their transition to Clemson University and aims to increase the recruitment, retention, academic success, and graduation rates of these students.

Within the state of South Carolina, there are 16 technical colleges. Almost 13% of the population of the typical college age range (18-25) are living below the poverty line [20]. For many low-income students, it may be better financially and for their families to attend a local technical school as opposed to a university, such as Clemson. When comparing the cost of tuition between schools, Clemson tuition is $15,120, and the highest cost of a technical college in South Carolina is $4,752, less than one-third of the cost at Clemson [21]. South Carolina technical schools currently enroll about 38% of the students pursuing higher education in the state [21]. Despite higher tuition, many students choose to transfer to Clemson after community college. Within the past ten years, there has been an increase in the number of students who choose the transfer pathway [22],[23]. Unfortunately, the historical success rate (as determined by semesterly retention rates) of community college transfer students to Clemson is less than those who are first-time students[24].

There are three main objectives that the SPECTRA program hopes to achieve. Firstly, SPECTRA seeks to provide scholarship opportunities to low-income students who wish to pursue engineering or computing at Clemson. Secondly, SPECTRA intends to build cohorts of transfer students to support their transition into Clemson University while also allowing for the ACE fellows program to aid in the training and practice of PhD candidates who wish to pursue careers in academia. Finally, SPECTRA will assess its progress both internally and externally to best assist the transfer students and improve the program.

Work done by SPECTRA thus far includes projects and work done by the ACE fellows, PhD candidates who spend a semester at a technical college teaching and building a cohort of SPECTRA students. One of the ACE fellows supported SPECTRA scholars in performing mechanical engineering research, which simultaneously taught the students mechanical engineering concepts and gave them the hands-on opportunity to collect and analyze data. Students were found to value this work and felt it helped them develop their skills and identities as engineers. Other ACE fellows ran a research course that involved multidisciplinary work, during which students were able to work with people outside of their majors. Additional work

showed that SPECTRA scholars found the graduate students' teaching to be effective for course material and useful in helping them transition to Clemson.

Discussion of Current Situation

The SPECTRA program anticipated significant yearly growth in the number of students participating in the program. It was expected that there would be 20 students in the first year, 52 in the second, and 70 in the third, accumulating to a total of over 300 students, with potentially half of those students in the fourth and fifth years of the program. Unfortunately, the actual numbers for the three completed years are much lower at 7, 12, and 28. The significantly reduced recruitment number limits the nature of what research can be performed. Some of the proposed research questions require a larger sample size for statistical analysis. The future sustainability of the project will largely rely on the number of students the project is able to reach out to. Although low recruitment has limited the quality of research needed to inform the construction of a sustainable program, we have been able to adapt to the recruitment issues by focusing on the research questions best answered by qualitative methods. Beyond the immediate research, the recruitment problem has resulted in a situation where we are unable to effectively connect to those students who are eligible to be able to support their needs.

Several causes for low recruitment have been proposed. The first year of the program included the early months of COVID-19, which impacted the in-person events. Much of the research relied on building the cohort through communities of practice which almost exclusively relied on in-person events. Project participants reported the virtual environment was new and awkward for the types of interactions they were accustomed to having. COVID-19 also played a role in a more indirect way. Because of the pandemic's impact on the need for scholarship funds, one of the cooperating technical colleges in the program used federal relief funds to provide free tuition for all students during the 2020-2021 academic year. This relief subsequently decreased the need for the funds that would have been awarded as part of the SPECTRA scholarship program.

Another potential impact was the effectiveness of the SPECTRA webpages and online promotional materials. Originally, the program planned for recruitment through in-person recruitment fairs and word of mouth from the current SPECTRA scholars, supposing that recruitment from the SPECTRA scholars to fellow students would be more effective. The transition to virtual environments forced us to examine our website and online presence. Similar programs were investigated to see what could improve our online presence. From this investigation, we identified three areas of concern that needed to be addressed: 1) strengthening relations/communication with the admissions department at the 4-year institution and the community colleges, 2) initiating a social media presence through Facebook and Instagram, and 3) updating the SPECTRA homepage to meet the needs of potential students.

Recruitment of students from technical colleges or other two-year programs is not unique to SPECTRA; other programs across the country also seek the inclusion and transfer of the students. As discussed in Houser [25], Pathways to the Geosciences at Texas A&M is a program that seeks to draw two-year college students into the geoscience department. They found that recruitment fairs and visits to programs yielded limited transfers to the program. To gain transfers, the Pathways to Geoscience program created detailed information packets for students,

including classes they would need, credits that would transfer, potential employers and jobs they could pursue with a geoscience degree, and milestones they will achieve through the program. This change resulted in a significant increase in their transfer rates from two-year institutions [25]. Other programs directed at STEM transfer students include the Increasing Numbers, Connections, and Retention in Science and Engineering (INCRSE) program at West Texas A&M University. INCRSE called for increased visitation of STEM faculty to local community colleges as well as their participation in workshops, improved the advising of transfers, and formed agreements between the community colleges and West Texas A&M. These recruitment tactics proved to be successful in drawing additional transfers to STEM programs [26]. The University of Tennessee's College of Agricultural Sciences and Natural Resources (CASNR) also saw a significant increase in the number of students enrolled in its programs by implementing a new recruitment strategy. One element of this strategy included using undergraduate students to serve as ambassadors of the college. These students conduct walking tours for prospective students, attend college fairs, as well as provide insight into the agricultural programs, the agricultural field in general, and university life. In addition to current students, CASNR also relies on high school guidance counselors, admissions counselors, and community college advisors to provide information to prospective students about the college. The college also improved its website, allowing students to find relevant information without much difficulty [27].

Conclusions

As of yet, there have not been statistically significant results from recent and upcoming changes in the recruitment process past our work at ASEE 2021 identifying this emergent need [1]; however, there have been several interventions through which SPECTRA hopes to achieve higher numbers of student participants. In the context of the technical colleges in the state of South Carolina, we are looking beyond existing articulation agreements with grant partners to include all students from all of the schools in the system. This will require that curriculum and course offerings be modified within some of the member institutions of the technical college system to match the programming required to support students' transfer to engineering and computer science majors at Clemson, which is made more complex as the technical college system in South Carolina is in the Department of Commerce, not the Department of Education as with undergraduate and graduate institutions.

In addition to policy and programmatic changes at the institutional, technical college level, we are implementing targeted revisions to how we communicate with students for whom this scholarship and support program would be most impactful by revisiting and improving existing relationships and creating new opportunities to connect with students and their families through social media and university websites. We are currently part of an NSF S-STEM Hub proposal focused on transfer students and have already connected with partners from collaborating institutions about our recruitment issues. If funded and enacted, our hope is to leverage experience and expertise from that community toward our issues in South Carolina. We invite researchers and practitioners working with STEM-focused transfer students in their transition from two-year to four-year institutions to connect with us and we welcome feedback on our work and guidance from yours.

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