

Lessons Learned in an NSF S-STEM Planning Grant Aimed at Supporting Transfer Students

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Background

There is a national need for a well-educated and diverse workforce of scientists, mathematicians, engineers, and technicians (STEM). One approach to help meet this need is to support the retention and graduation of historically underrepresented STEM students. The National Science Foundation Scholarships in STEM (S-STEM) program “seeks to increase the number of academically promising low-income students who graduate with a S-STEM eligible degree and contribute to the American innovation economy with their STEM knowledge.” As higher education institutions continue to grapple with declines in traditional enrollments, we focus on a critical subset of STEM students with strong academic potential and high financial need: those who seek to transfer from a community college and continue their education at a 4-year university. This project aims to build a pathway and devise programming for students to transfer from Alamance Community College (ACC) to Elon University (EU) to pursue bachelor’s degrees in biology, chemistry, computer science, engineering, environmental studies, mathematics, and/or physics. Early work has focused on needs assessment with the support of a collaborative S-STEM planning grant from the National Science Foundation (Award #2130435).

Underrepresented minority students often differ from majority-identifying students in one or more types of “capital,” which are needed for successful completion of a STEM degree [1]. Three capitals are evaluated as part of this work. Social capital deals with the quality of interactions between people and community resources. Highly successful STEM students have robust and diverse social networks which provide support throughout their academic career. Navigational capital concerns students’ ability to make their way through social institutions that are often structured for and by majority groups, leaving minoritized and/or underrepresented groups without the means to find the necessary resources and support services needed for success. Finally, aspirational capital is the result of optimism, resilience, and growth mindset that propels students forward even in the face of barriers [1]. To effectively support ACC students on their pathways as they transfer and continue at EU, it was necessary to first assess the levels of social, navigational, and aspirational capital exhibited by our target population and then propose programming and interventions to bolster these assets.

Objectives

Broadly, we pursued two areas of assessment: (1) an evaluation of the needs and expectations of faculty and students in the STEM communities at EU and ACC and (2) formative and summative evaluation of pilot programming to support student success and faculty professional development. Here, we report on an assessment of needs and expectations of students in STEM communities at EU and ACC, evaluate pilot programming aimed at transfer students, and address the following goals:

1. Describe social, navigational, and aspirational capital of STEM transfer students.

2. Learn about needs and expectations of STEM students who transfer to a 4-year school.
3. Identify how transfer and traditional students experience physical spaces on campus.
4. Learn about culture and classroom environments at both institutions.

Research Design/Program Description

This report includes results from three assessment instruments that each address one or more of the four goals. The study received ethics approval through IRB Exemption. Participation in each of the study components was voluntary. Participants were recruited from current ACC students enrolled in STEM courses (N = 96) and EU transfer students who were identified as STEM majors by the university Registrar's office (N = 44). Prior to the study, participants were given a debrief and the option to sign an informed consent form.

We administered the STEM Student Success Literacy (SSSL) survey [2] via email, which measures community college students' degree of self-efficacy and social capital, in addition to their knowledge about the transfer process (Goal 1). A total of 23 students completed the SSSL (5 from ACC, 18 from EU). Although we lack statistical power to analyze results for the ACC population, results from the EU transfer student population are discussed below. Students were entered into a drawing for a chance to win a gift card if they completed the survey.

We then completed dyadic interviews (one at ACC, three at EU) to document the degree of social, navigational, and aspirational capital (Goal 1), students' perceived needs and experiences during the transfer process (Goal 2), qualitative information about how transfer student experience physical spaces on campus (Goal 3), and to learn about the differences in institutional culture and classroom environments between ACC and EU (Goal 4). Each interview lasted ~45 minutes with open discussion around a set of predetermined guiding questions. Students were offered gift cards for participation.

Finally, we completed a Community Asset Mapping (CAM) activity with 30 STEM students at ACC. Modified from [3], the CAM consisted of two parts. Students were provided blank paper and drawing tools and were asked to design a map of an "ideal" four-year institution. Through dialogue and collaboration on the visual products, the CAM provided opportunities to capture qualitative data about students' perceived social, navigational, and aspirational capital (Goal 1), and their shared vision for a successful transition to four-year college. After the mapping activity, students completed a short survey pertaining to the capital framework [1] and factors most relevant to their selection of transfer institution.

Results/Evaluation

Assessment of needs and expectations of EU and ACC STEM students

Self-efficacy and growth mindset may serve as proxies for determining students' levels of social, navigational, and aspirational capitals [4, 5]. Results from the SSSL and dyadic interviews provide insights into these characteristics for EU and ACC students.

In response to the SSSL (EU students only) and the dyadic interviews (ACC and EU students), students showed strong indications of self-efficacy and evidence of growth mindset.

Most students selected “slightly agree” or “strongly agree” in response to statements that illustrated student’s drive, persistence, and organizational skills, and very few selected these options for statements indicative of fixed mindset or low self-efficacy. Students also demonstrated high levels of self-confidence in their academic and social skills, which speak to social and aspirational capital. On the SSSL, the highest numbers of students reported that they perceived themselves average in computer skills, writing, and public speaking, and above average in math and social skills. Few students reported that they consider themselves lower than average in academic areas. With respect to social skills, the highest numbers of students indicated comfort with making friends and social gatherings.

Dyadic interviews corroborated the SSSL data. When asked about the personal assets that most contribute to their academic success, students at ACC and EU discussed traits such as “strong self-determination” and being a “hard worker.” One student from ACC said “Discipline. I can sit down and struggle through it.” EU students expressed similar sentiments and often tied their strong work ethic and determination to other motivational factors, such as doing well in order to stay on a sports team or to make their family proud. We note that perspectives were shared by only two ACC students.

All students who completed the SSSL indicated a desire to earn at least a bachelor’s degree, and most aspire to a master’s degree or higher. During interviews, ACC students talked about finding jobs that would allow them to pursue their passions and maintain a healthy work-life balance. For example, one ACC student said, “I want to be able to still do the sport I love near {specific location} ...I want a job that allows me to focus on one thing at a time.” EU students also focused on extracurricular passions and also noted the importance of financial stability. For example, one EU student said, “I need a job that pays well and has regular hours. I want time and funds to pursue my hobbies.” Geographic location was not an important variable in determining the quality of the STEM job or career.

EU transfer students expressed that having informed academic advisors who understand the transfer process well was a critical factor in determining their success on campus. Many spoke positively about their experiences with their advisors, but some wished they had more information to better advocate for themselves when their advisors were ill-informed or lacked information pertinent to their unique circumstances.

EU transfer students mentioned the need to have more access to common resources on campus (e.g., 24-hour access to a gym or quiet space). In addition, EU transfer students often also hold identities outside the university that may complicate navigating their EU experience. For example, transfer students who are also international students and/or athletes have additional barriers that may compound the challenges they face as a transfer student. One international student shared her frustration about the grade transfer process. “My {country of origin} grades were lowered when I came here, which isn’t fair.” A EU transfer student athlete talked about the need for more access to gym resources. He said, “I need a 24-hour gym. I have to pay to go somewhere else to work out at night.” Such issues, if not resolved, could serve to isolate students and draw about resentment or contention, especially for students in STEM majors who are

pressed to complete their required number of credit hours on a tight timeline or work around practice/conditioning schedules.

Both ACC and EU students shared their collective desire for more social engagement. ACC students indicated that few social opportunities exist at ACC, and such events are often poorly attended. They shared their wishes to join academic- and non-academic social groups to enhance their sense of community. EU transfer students shared similar sentiments, suggesting they felt isolated from their peers once they started their studies at EU. Some talked about the prevalence of cohorted programming (e.g., Honors programs) at EU in which they were unable to participate, because these programs lack entry pathways for transfer students. EU transfer students also shared a general sense of being “left behind” or “not included” due to the strong bonds among cohorted groups and/or social groups that form in first-year courses and persist into higher level courses (e.g., establishing study groups, lab partners, project teams, etc.).

Evaluation of pilot programming aimed at transfer students

Based on the literature and results from dyadic interviews and with help from collaborators in the EU student academic support Office of Learning Assistance, two workshops were provided at EU during New Transfer Student Orientation in August 2025. The workshop titles and descriptions were:

- ***Growth Mindset & Belonging + Finding and Building Community on Campus***
Participants explored growth mindset from a theoretical perspective and also learned strategies for supporting one another (i.e., encouraging a growth mindset in one another). [This workshop aimed to help participants build aspirational and social capital.]
- ***Navigating University Culture + Utilizing University Resources***
Facilitators helped students "decode" the hidden curriculum of higher ed, which is pronounced at EU, where traditions can cause some students to feel confused and out of place, and students sometimes struggle to seek help. This workshop included discussion of campus resources that can help participants navigate EU. [This workshop aimed to help participants build navigational and social capital.]

The workshops included a brief introduction to the Office of Learning Assistance and services available to students: subject tutoring, peer success coaching, peer-assisted learning sessions, accountability groups, and student success consultations. To encourage sustained building of navigational capital through engagement with the Office of Learning Assistance, workshop attendees were offered a gift card for using any combination of these services five or more times throughout the Fall 2025 semester. Four students (of 27) used the services and two of the four earned gift cards. Workshop attendees were asked to complete pre- and post-workshop surveys to assess levels of growth mindset, social, aspirational, and navigational capitals, and to characterize learning gains from the workshops. Across all four surveys, non-STEM majors represent about 80% of responses, while STEM majors represent about 20% of the data.

As with student responses during the needs assessment described above, workshop participants reported high levels of self-efficacy and growth mindset, and low/neutral levels of concern regarding social and navigational capital measures, like finding support or making friends. A thematic coding analysis revealed common themes around students' choice to enroll at EU: $\geq 20\%$ of the codes mapped on to “perceived quality of the institution”, “program alignment”, and “campus feel/culture” (e.g., “I wanted a bigger environment, a fresh start, and great education”, “I felt like I would find better community here”). Thematic coding also showed three themes related to students’ career aspirations: obtaining a specific job/career, finding a “good” job, and continuing to professional/continued education opportunities. Students reported overwhelming support from their families and communities. Over 80% of students indicated immediate and extended family support, 68% indicated support from the larger community, and $< 50\%$ indicated support from community mentors, coaches, etc. They shared explanations about the nature of that support, ranging from “supporting their passion”, to “high expectations to follow family desires for a specific career” (e.g., “My family just wants me to succeed and be happy,” “I think everyone expected me to become a teacher in some capacity”). After the workshop, all participants reported high levels of knowledge gain across a range of areas, including ways to strengthen GM and build support systems, their understanding of university traditions and the “hidden” curriculum, and in applying their new knowledge more broadly.

Conclusions

All new students entering university need support to help them transition successfully, but transfer students may be especially vulnerable and overlooked. According to Wang [6] “For community college students, having a high degree of aspiration is the first step toward completing a postsecondary degree.” Transfer students who enter EU report strong levels of self-efficacy and healthy mindsets, but such characteristics can quickly be challenged in settings in which students do not feel a strong sense of belonging. Programming informed by transfer student voices and coordination between both academic and social spaces on campus can help transfer students find needed resources as they continue their pursuit of STEM degrees.

Future Plans/Lessons Learned

As specified in the NSF S-STEM guidelines, this project initially included administrators and investigators at both institutions, but the project leaders are at the EU. Initially, all aimed to use the data and results to inform a Track 3 proposal submission. As that effort gained traction, the investigators at EU learned that personnel changes resulted in nearly all of the original collaborating ACC administrators leaving the institution, and that successors were not well informed about the project. We seek to continue this important work of developing evidence-based programming to support transfer students; however, for it to continue between these two institutions, time and care must be devoted to rebuilding key relationships. The critical lessons learned are to establish and sustain active involvement of all key personnel at both institutions, including active leadership at both institutions.

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