

## Increasing Success for S-STEM Scholars at Small, Private, Rural Universities

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## **Increasing Success for S-STEM Scholars at Small, Private, Rural Universities**

### **Motivation and Background:**

This paper details the unique background, successes, and opportunities for improvement in the S-STEM program at Ohio Northern University (ONU) funded by NSF grant# 2221138 through the Directorate for STEM Education/Division of Undergraduate Education (EDU/DUE). For those unfamiliar, S-STEM seeks to support low-income, high-academic-potential students through financial scholarships and additional supports. In the College of Engineering (COE), low-income students have lower persistence and graduation rates than the rest of the college. At the time of proposal submission, one-year retention was 83% and 88% for potential Scholars (Pell grant eligible, a high school GPA of 3.75 or higher, and an unmet need greater than \$7,750 annually) and total COE population, respectively. Furthermore, 6-year graduation rate was at 64% and 79% for potential Scholars and the total COE population, respectively, for students entering in 2015. So, while these numbers were better than the national averages, they still show room for improvement at ONU.

ONU is located in rural northwestern Ohio in a town of approximately 3,000 people. As of the Fall census of the year the proposal was submitted, the school had 3,116 students total with 645 in the COE. It is a residential campus with most students living in on-campus housing for their first three years. At the time of writing the proposal, there were 66 (or just over 10%) of COE students that would have been eligible to be scholars. Approximately half of these students were in mechanical engineering, a quarter in civil engineering, and a quarter in the electrical engineering, computer engineering, and computer science department; this breakdown roughly matches that of the entire COE. These potential scholars had an average cumulative GPA at ONU of 3.27 and an average unmet need of \$17,277.

ONU's COE's mission to engage students through personal relationships and remarkable opportunities, has led to the better-than-average rates of retention and graduation in this pool of potential scholars compared to the national trends. Yet, a gap still persists that is being addressed by the goals of the project. These efforts aim to address the major issues cited by prospective scholars who left the program prior to the grant award, including financial, personal, and academic challenges. Specifically, the program seeks to ease the financial burden through scholarships, reduce personal problems through fostering a sense of belonging, and address academic issues through workshops to increase self-efficacy.

Students who find supportive friends and adult mentors can have a smoother transition into college and feel supported on campus. This helps students to boost their sense of belonging and self-esteem to succeed both academically and socially [1-3]. Researchers have posited that developing an engineering identity impacts student's persistence and retention [4-6]. Since all of the scholars were high achieving in high school, the need for self-efficacy is likely less about

actual academic ability and more about getting the students to believe in themselves, see they aren't the only one struggling at times, and have a group to support and cheer each other on.

### **S-STEM at ONU:**

The S-STEM program at ONU starts with the selection of scholars. All students who are eligible, as previously defined, are contacted by admissions and invited to complete an application. The simple application has one main component: answering one of two essay options (200-500 words): 1) What is a challenge you have encountered and how have you overcome it? or 2) Describe your motivation for pursuing Engineering. The financial aid office verifies that the applicant meets the requirements and compiles a list for the PI-team to make selections. In the three years of the program, an average of 15 applicants have met the requirements for the five spots. Since this process is before students have made their final selection of university to attend, 7 or 8 offers are usually made.

As required by the S-STEM program, financial need, low income status, and progression toward a stem degree are the only requirements to receive scholarships, but the scholars are heavily encouraged to participate in mentorship, cohort building activities, and workshops. Each scholar has an upperclass peer mentor for their first two years in the program and a faculty mentor every year in the program. They are encouraged to meet at least once a month with each mentor. More details on these meetings are in the assessment findings section since they were highlighted as an area for improvement.

The workshops and activities run have focused on developing this sense of cohort, community, and belonging. Workshops for students have focused on mental health, building study habits, and adopting a strength-based mindset. Since faculty can play such a crucial role, positive or negative, in determining whether a student feels at home in the college, two mentoring-focused workshops have also been run for faculty. The success of these interventions were evaluated by the external evaluator, Sarah Zappe, who conducted surveys and interviews. Specifically, they measured belonging by the scale described in [7] and engineering identity using the Godwin scale [8].

### **Assessment Findings:**

As the program enters its third year, the one-year retention rate of the scholars is 90% with 80% on track to graduate in 4 years. This represents 10 scholars with one switching majors but still at ONU after one year, and one switching to a University closer to home after two years. With the third cohort starting this past August there are two years of data showing positive trends.

Eight students were interviewed in May of 2025. The group included three first-year students and five second-year students, one of whom was new to the S-STEM program. Due to the small number of students, this section will focus on trends from these interviews rather than

quantitative data from surveys. As the project progresses and more students are involved, the quantitative data will be more useful. The scholarship was consistently described as one of the most critical aspects of the S-STEM program. As one student remarked, “Honestly, the scholarship is what kept me enrolled last semester.” Even for those who said they could have attended without it, the scholarship reduced stress, lessened the need to work long hours, and allowed them to focus more fully on academics and professional development. Another student said, “I would have had to work a lot more, and that could have affected my grades.”

The majority of the students were quite pleased with the faculty mentorship component of the program. Four areas of strength were academic guidance, professional development, increased confidence in interacting with faculty, and having a role-model to provide perspective both on academic matters and life more broadly. As one student said, “It was just really nice to have a professor that I felt comfortable going to and talking to.” While these are positive and a clear sign that the relational focus of the college is important, there were also some areas of improvement as discussed in the next section.

Students expressed mixed perceptions of the peer mentorship component. Students generally saw benefit in their first year, especially in regards to social/informal support, in that they primarily engaged in surface-level or casual conversations rather than providing in-depth mentoring on the academic process. This is definitely a positive step toward belonging, but there are clear avenues of improvement that came to light and are discussed next.

Scholars generally enjoyed the workshops (mental health, forming habits for success, strengths based approaches, and understanding stakeholders in engineering), while requesting topics more relevant to them, such as study skills and habits, which will be addressed in Spring 2026. They also enjoyed the less formal ones, seeing them as good places to meet their peers and build community.

### **Lessons Learned:**

Generally, the scholars have positive feelings towards the program, but obviously there are always ways to improve. Mentoring is the most important area for improvement, both because it had the clearest need from the scholars’ interviews and because of its importance in fostering belonging and persistence. For faculty mentoring, the faculty mentors will state clear expectations of meeting at least once a month with each scholar and have at least a topic or two each month to talk about in case the scholar does not have anything on their mind at the moment. It should also be noted that faculty in the COE at ONU have an open-door policy and that much informal-mentoring goes on throughout the semester.

The external evaluator made several recommendations for the peer mentorship component of the program:

- Establish expectations for both students and mentors about minimum number of times to meet
- Provide suggested conversation starters to mentors that may add value to the meetings
- Discuss ways that second-year students can get value by connecting with their peer mentors
- Examine the training for the mentors and see if it needs to be expanded to encourage proactive engagement

This year, the S-STEM team implemented several refinements to strengthen mentoring and student engagement. Clearer expectations were communicated to both mentors and mentees at the start of the semester, followed by monthly “newsletter-style” reminders that included suggested discussion topics aligned with the academic calendar (e.g., during registration period, mentors were encouraged to discuss general education requirements and course planning). Mentors were also encouraged to remind their mentees to attend all the S-STEM events. To broaden impacts, all scholars were encouraged to bring friends in order to build a larger sense of community. Now with a third-year cohort, older scholars served as peer mentors for the first time. This structure is expected to strengthen support and foster proactive engagement, as peer mentors can draw directly on their recent experiences as mentees. Additionally, “The Innovation Den” has been adopted as a unifying name for study sessions, breakfasts, and gatherings to create a consistent and welcoming program identity. At the beginning of the semester, scholars were invited to provide input on event preferences, including food and activity options, and this feedback was incorporated into programming (e.g., selecting a local Italian restaurant for a novel evening event). Because this academic year is still in progress, formal assessment data are not yet available.

Workshops and monthly cohort meetings have been positively received, but there are a couple of updates planned based on student feedback. For example, evening events have been added since some scholars requested it. In response to scholar requests, an external speaker will be brought in to run a workshop for students and one for faculty on how learning works and concluding with how students can use this to increase the effectiveness of their study habits and how faculty can use it to optimize their courses. The annual surveys and interviews will be used to assess the impact of these updates and shared with the broader community as described in the next section.

### **Extending The Success:**

The external evaluator and (co)-PI team are very active in the ASEE and KEEN communities, as well as other engineering-education focused conferences and organizations. Therefore, their network includes faculty and staff at a wide variety of organizations, many of which are also small, private, rural institutions. While no two schools are identical, the discussions at these events indicate that similar issues and concerns exist about supporting low-income,

high-academic-potential students to persist to graduation and ultimately rewarding careers in STEM.

The intent is to use this poster session as a spring board to discuss this program more specifically with colleagues at other institutions and develop a more detailed analysis of the generalizability of this work, as well as an action plan to disseminate and test its effectiveness. Ultimately, the goal is to take the insights gained from this and similar conversations and run one or more workshops at an ASEE conference, or KNC (KEEN national conference) to extend the success of this work.

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