BOARD # 314: 2024-2025 Progress Report for the S-STEM Project: Removing the Disparity in Success-Related Outcomes Between Academically Talented Low-Income Engineering Students and Other Engineering Students

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Renata A. Revelo is a first-generation college student, migrated from Ecuador to the United States as a teenager with her parents and sister. She is the first in her family to obtain a Ph.D. She is currently a Clinical Associate Professor at the University of Illinois, Chicago in the department of Electrical and Computer Engineering. Her research focuses on shifting the culture of engineering via the study of engineering identity which centers students of color and examines systemic change

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Betul Bilgin is a Clinical Associate Professor of Chemical Engineering at the University of Illinois at Chicago (UIC). With a Ph.D. in Chemical Engineering from Michigan State University, Dr. Bilgin has extensive experience in both biotechnology research and engineering education. Since joining UIC, she has developed and taught various undergraduate courses, integrating innovative teaching methods and industry-relevant content to enhance student learning and engagement.

Dr. Bilgin's research focuses on engineering education, particularly in fostering professional identity among engineering students and integrating data science into the chemical engineering curriculum. She has received multiple awards for her contributions to teaching and mentoring, including the ASEE Ray Fahien Award and the UIC COE Harold Simon Award. Dr. Bilgin is also actively involved in professional service, currently serving as the Director of the Chemical Engineering Division for ASEE and participating in various initiatives to improve engineering education and student success.

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SUCCEEDS Project under NSF DUE: Lessons Learned from Scholar Recruitment and Summer Bridge Program Subsystems

Introduction

The S-STEM program addresses the underrepresentation of low-income students in STEM fields by providing financial, academic, and professional support. As a Minority Serving Institution, UIC leverages the S-STEM framework to enhance first-year retention and graduation rates among underrepresented populations. The program includes financial aid, mentorship, and targeted preparatory initiatives like the Summer Bridge Program (SBP).

This paper evaluates two critical subsystems: the Scholar Recruitment process and the SBP. The recruitment subsystem employs a structured, rubric-based methodology to select students with demonstrated academic potential and a commitment to engineering. The SBP fosters cohort bonding, educational preparedness, and professional growth through a one-week residential program. The primary goal of this paper is to report on the implementation success of these subsystems and to analyze the outcomes from surveys conducted before and after the SBP to assess their impact on scholar retention and success.

Recruitment Subsystem Methodology

The recruitment process for the S-STEM program at UIC is designed to ensure the selection of academically talented and committed scholars. This multi-layered process began by filtering an initial pool of 363 PELL-eligible students, removing candidates under 18. The remaining students were ranked based on their high school GPA and intended majors, and the top 200 candidates were invited to apply. Of these, 56 students submitted applications, which included an essay prompt: *"In 100 words or less, explain why you want to study Engineering at UIC and why you have selected the specific Engineering major you have been admitted to."*

Applicants were grouped by their intended major and interviewed by professors and core investigators from their respective departments. These interviews aimed to assess the seriousness and informed nature of their decision to pursue engineering. Key questions addressed applicants' familiarity with engineering coursework, their sources of information, and whether they had consulted with mentors or family members with engineering experience.

Candidates were informed that if selected, attendance at the SBP was mandatory. Professors ranked candidates using a rubric based on academic potential, essay quality, and interview performance. The highest-ranked students were offered scholarships. Due to higher-than-anticipated financial needs, 18 scholars were selected instead of the initially planned 25.

Demographics

Table 1: Scholar Information for Cohort 1

Cohort	Gender		Race[1]				Department[2]							1st Gen		Total[3]
	M	F	A	AA	H	W	BME	ChE	CME	ECE	CS	MIE	U	Y	N	
Fall '24	9	9	3	3	10	2	2	2	1	4	4	4	1	11	7	18

[1] Race - A: Asian, AA: African American, H: Hispanic, W: White.

[2] Department - BME: Biomedical Engineering, ChE: Chemical Engineering, CME: Civil, Materials, and Environmental Engineering, ECE: Electrical & Computer Engineering, CS: Computer Science, MIE: Mechanical and Industrial Engineering, U: Undecided.

[3] At the start of the Fall 2024 semester, cohort 1 had 18 scholars. Before the semester finished, a scholar had dropped out of their degree to pursue entrepreneurial interests. Another scholar had dropped out of their degree before the start of the Spring 2025 semester due to not enjoying engineering and wanted to pursue a non-educational career. [1]

Summer Bridge Program

The SBP is a one-week residential program designed to help freshman scholars build a solid foundation for their educational journey. Scholars were given brief introductions to the different engineering departments, and informative sessions were held by on-campus resources such as the Disability Resource Center, Financial Aid and Scholarships, and the Counseling Center. Additionally, scholars were guided through UIC's educational system, helping them set and navigate their academic goals effectively. Reflection exercises and peer discussions fostered a sense of community and academic readiness among scholars.

Surveys conducted before the SBP revealed common concerns among scholars, including fears about rigorous coursework, financial stress, and imposter syndrome. There was a notably low awareness of campus resources such as the UIC CHANCE Program and Counseling Services. Mentorship engagement was limited; before the SBP, only 17% of scholars had met with a faculty mentor, 33% had met with an industry mentor, and 72% had met with a peer mentor.

Post-SBP surveys indicated marked improvements in scholar confidence and resource awareness. All scholars reported a better understanding of course requirements and increased familiarity with mentorship. Workshops and seminars received high ratings; 72% of scholars thought sessions on financial aid were beneficial, and alumni panels were identified as particularly impactful. Despite these developments, concerns about economic challenges and workload persisted.

Challenges Identified

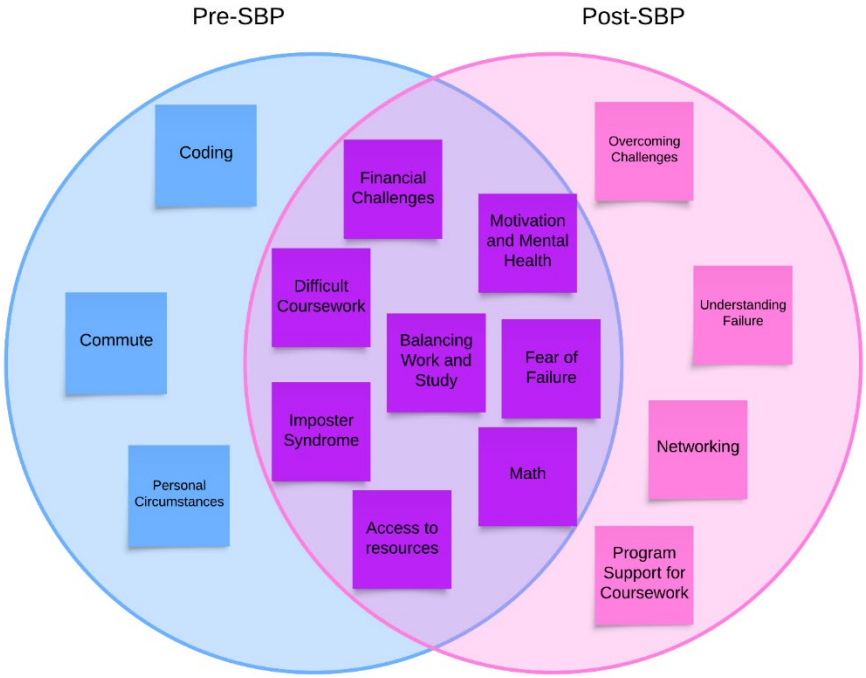

Figure 1. Fears about not finishing a degree at UIC

Figure 1 shows persistent barriers, including financial stress, coursework rigor, and the need for expanded mentorship frameworks. Addressing these challenges requires ongoing adaptation of program components.

Results

18 scholars were successfully identified and offered the S-STEM SUCCEEDS scholarship, and all 18 scholars were fully involved in all activities and seminars offered through the Summer Bridge Program. Of the 18, only one scholar left before the completion of the first semester, with another scholar leaving after completing the Summer Bridge Program. Most scholars, if not all, had a better idea about the scholarship and the support systems to help guide the scholars through college. Surveys demonstrated significant improvements in scholar preparedness and confidence. They highlighted the value of targeted mentoring and structured workshops in enhancing academic readiness. These outcomes validate the effectiveness of the multi-layered selection and SBP frameworks.

Conclusions and Future Work

The recruitment process and SBP subsystems have significantly enhanced the likelihood of first-year retention and academic preparedness among low-income engineering scholars. Future efforts will focus on tracking academic performance every semester, monitoring shifts in engineering majors, and evaluating career outcomes. Enhancements to mentoring frameworks

will address persistent barriers, such as financial literacy and mental health support. Long-term studies will provide insights into the program's sustained impact on scholar success.

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