COMMUNITY COLLEGE S-STEM NETWORK

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S-STEM STRATEGY BRIEF

CCSN Mission:

The Community College S-STEM Network (CCSN) connects and supports researchers and practitioners in conducting and translating research on how students navigate STEM pathways into evidence-based practices, programs, and policies.

Sense of Belonging and STEM Identity in S-STEM Program Supports

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Introduction

This strategy brief examines how students and faculty at one community college understand and engage with the supports provided through the S-STEM program. In 2017, Everett Community College (EvCC), located in the Puget Sound region of Washington state, successfully secured an NSF S - STEM grant. Following the completion of their first five-year grant cycle, the college was awarded a new S-STEM grant in 2022. From the outset, EvCC viewed the S-STEM program not just as a scholarship opportunity but as a comprehensive initiative aimed at enhancing the financial, academic, and co-curricular aspects of the college's STEM pathway.[1] As in all S-STEM grants, the target population is low-income students. In addition, EvCC serves 50% students of color and 50% women and non-binary students. Students represent many STEM transfer disciplines such as biology, chemistry, computer science, engineering, environmental science, physics and others.

Major Strategies in the S-STEM Grant

- Assign each student a faculty mentor who is a subject matter expert in their field and a member of the grant leadership team.
- Coordinate quarterly field trips and social activities. Field trips are academic (e.g., visiting potential transfer institutions), social, or career-related.
- Provide students with peer mentors in the first year and career mentors in subsequent years.
- Deliver enhanced academic support in STEM gateway courses through course-specific tutoring.
- Infuse equity into the classroom by training faculty in best practices.

[1] Washburn, K., & Bragg, D. D. (2022). How NSF S-STEM Scholarship Students Experience College During Covid-19: Lessons to improve STEM education. In Community Colleges' Responses To Covid-19 (Pp. 47-57).

Implementation of the Selected Strategy

When EvCC developed its S-STEM grant, the institution planned a range of activities and supports to enhance the academic success of STEM students. However, due to staffing changes, resource constraints, a new computer system implementation, and the lingering effects of COVID-19, not all planned activities came to fruition as originally envisioned. In student interviews, we found that some activities, such as field trips to transfer institutions, were readily recognized by students as valuable. However, the value of other supports, such as course-specific tutoring, that faculty felt would be important, was not as evident for students. Students felt they were able to find academic support through developing close relationships with faculty, meeting and forming friendship relationships with peers in the S-STEM program that led to forming informal study groups and taking advantage of the tutoring center. This led us to conclude that students interpret and make sense of the S-STEM program's supports and activities in diverse and sometimes unanticipated ways. As one faculty member remarked, "There's a difference between what I think is important and what has turned out to be important [to students]."

Significant Features of the Selected Strategy

The development of a strong STEM identity, referring to how individuals see themselves and are recognized by others as "science people" and sense of belonging, students' perceived social support on campus, a feeling or sensation of connectedness, and the experience of mattering or feeling cared about[2] emerged as a central theme in students' experiences. Drawing on concepts from science identity theory,[3,4] our findings suggest that the S-STEM program played a pivotal role in fostering students' acknowledgement and recognition by themselves and others (peers, instructors) as a science person. Students reported feeling more connected to the STEM community and more confident in their academic pursuits through the S-STEM scholar designation and through the program's structured community-building activities. As one student noted, "I feel more confident in what I'm learning, and I feel like part of it is because of S-STEM." The program's emphasis on community integration proved particularly important for students' engagement and aspirations. The community-building activities, including field trips and peer

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[2] Strayhorn, T. L. (2012). College students' sense of belonging: A key to educational success for all students. New York, NY: Routledge.

[3] Carlone, H.B. & Johnson, A. (2007). Understanding the Science Experiences of Successful Women of Color: Science identity as an analytic lens. Journal of Research in Science Teaching: The Official Journal of the National Association for Research in Science Teaching, 44(8), 1187-1218.

[4] Hazari, Z., Sonnert, G., Sadler, P. M., & Shanahan, M. C. (2010). Connecting high school physics experiences, outcome expectations, physics identity, and physics career choice: A gender study. Journal of Research in Science Teaching, 47(8), 978–1003. https://doi.org/10.1002/tea.20363.

interactions, facilitated students' engagement with professionals in the field, further solidified their interest in STEM careers. Students appreciated the program's ability to foster both social and academic connections, which bolstered their confidence in pursuing opportunities outside their comfort zones. One student reflected, "If I didn't have the S-STEM program, I'd probably be a lot more to myself and wouldn't jump at certain opportunities."

Evaluation/Data on the Selected Strategy and Grant

Whereas much of the existing literature on STEM identity development focuses on four-year college students,[5,6] our study demonstrates that community college students may develop STEM identities through STEM network development and peer and faculty recognition. In particular, the S-STEM scholar designation itself acted as a powerful form of institutional recognition that catalyzed students' self-identification as legitimate members of the STEM community. This finding suggests that the process of STEM identity development in community colleges may be more closely tied to the support and recognition students receive from their institutions and peers rather than to their personal interest in the field or intrinsic motivation to succeed.

Lessons Learned

First, the team found that a theory of change was emerging as the grant was being implemented and that faculty and students were converging around the importance of a sense of belonging and STEM identity as an organizing and unifying theme to guide program activities and supports. Second, while comprehensive support programs like S-STEM require substantial resources and coordination, even partial implementation and modest programs can yield meaningful benefits. Key elements of the program—faculty mentoring, peer communities, and financial support—worked synergistically to enhance student outcomes. These components can be incorporated, even in resource-limited contexts, to create a holistic support system that addresses both academic and social needs.

[5] Carlone et al., Understanding the Science Experiences of Successful Women of Color.

[6] Godwin, A. (2016, January). The Development of a Measure of Engineering Identity, in ASEE Annual Conference & Exposition.

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