

Navigating S-STEM: Student Perspectives on Success in Community College [work-in progress]

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Abstract

Building a robust and diverse STEM workforce is essential for fostering innovation and addressing global challenges [1]. This qualitative phenomenological research study investigates the experiences of academically talented, low-income STEM students participating in a scholarship and support program at a community college. The study examines how these students engage with program resources and navigate their educational journeys within STEM disciplines. These student's lives are characterized by complex logistics and often competing priorities that they attempt to balance. Intentional programmatic support services and a sense of belonging coupled with scholarship monies allow them to achieve a delicate work-life balance, reduce stress, and remain in STEM disciplines. Despite these intensive services and financial support, many expressed uncertainty around transfer. Implications for improving institutional practice and policy will be discussed.

Introduction

Community colleges hold the potential for diversifying the pathway into STEM because they serve a large proportion of the academically talented, low-income, first-generation, and racially minoritized students traditionally underrepresented in STEM fields [2;13]. However, low-income students are less likely to enter STEM programs in community colleges or to transfer to STEM fields than higher-income students [15]. A frustratingly large fraction of community college students who complete STEM courses leave college without any postsecondary credential [2] and Black, Latinx, and Native American students are underrepresented in all transfer-level STEM courses in community colleges [2]. Moreover, students who start at community colleges often encounter financial and structural challenges that make it difficult to complete STEM programs and reach their goals [2;14].

One federally funded policy lever that aims to retain more low-income students in STEM is the NSF S-STEM program. S-STEM provides scholarships for low-income, academically talented students. Colleges are required to spend 60% of funds on student scholarships. At the same time, faculty and staff develop and implement program supports they design with the goal of retaining more of their scholars. The theory of change undergirding S-STEM is that needs-based student scholarships coupled to education-focused strategies will enhance college success for students who would otherwise be unlikely to begin and finish a STEM education [8].

Theoretical framework & research questions

Grounded in the theoretical frameworks of a sense of belonging and engineering identity theory, this research situates student decision-making within an intricate ecosystem of competing priorities faced by S-STEM students as they balance coursework, transfer opportunities, and career aspirations [12]. Previous literature has focused specifically on belonging in STEM [9], revealing that sense of belonging is associated with retention in STEM majors [4; 10; 7]. Sense of belonging and its application with STEM students is furthered by engineering identity theory

[5]. Engineering identity refers to how students see themselves as the kind of person who encompasses an engineering role. However, Gopalan & Brady [9], found less sense of belonging in two year vs. four year colleges but also suggest “greater variability in student backgrounds, goals, and experiences means that general institutional belonging is less important to two-year students than belonging in a course, major, or profession.” (pg. 3). They suggest more in-depth studies of belonging community colleges are needed to further elucidate the processes at play.

The research is guided by two central questions:

1. How do the financial, academic, and social support elements of the program influence students' decisions throughout their STEM pathways?
2. In what ways does the institutional context shape STEM students' decision-making processes?

This ongoing study aims to bridge the gap between community college literature, policy, and practice by examining how the National Science Foundation-funded S-STEM program facilitates student success in navigating their pathways to and through community college STEM majors.

Methods

This research study utilized a qualitative semi-structured interview approach as part of a larger case study to examine the lived experiences of 15 undergraduate, low-income students majoring in STEM disciplines at a community college who were recipients of an S-STEM grant and four faculty and staff who were charged with designing and implementing the program. Qualitative interviews allowed for discovering meanings, exploring experiences in depth, and providing rich detail of the meaning making [11]. Given our research questions, we were especially interested in exploring the “why” and “how” behind the student’s experiences [11].

Participants were recruited through an email invitation by the research team. They were assigned a pseudonym and interviewed individually or as part of a small group of two or three students to facilitate scheduling. A semi-structured interview protocol was used. Interviews were conducted at the community college by a member of the research team and recorded, transcribed and summarized by a second member before being coded using a thematic analysis approach with NVivo software. The research design and interview protocol were reviewed and approved by the institutional research board for human subjects compliance at a major research university.

Reflecting the diverse nature of community college students, nine of the fifteen participants were underserved minority students, four were over age 30, eight were female, and eight were first year students. All were considered low-income and Pell eligible.

Findings

As we near the completion of data analysis, five significant themes have emerged that may be further refined or explicated as we finalize our larger manuscript: (1) The critical role of intentional programmatic support systems in fostering student identity and a sense of belonging, which are vital for STEM success. (2) The diverse, complex and competing influences and

factors impacting STEM decision-making related to retention, transfer, and post-community college experiences. (3) The critical, if somewhat unintentional, role of sense of belonging provided by the scholarship and recognition as being a “STEM Scholar.” (4) Financial stress is an ever-present reality for low-income community college STEM students. While this stress was reduced by scholarship monies stopping out of school due to finances and the need to work remains a real possibility for these students. Finally, (5) despite these services and financial support, many expressed uncertainty around transfer. Some were unsure how to “make it work,” financially, some did not find the major they were looking for in a logistically feasible local option, and some others were nervous about leaving the support system they had built and understood. They had established a foothold at their community college, one that would need to be reestablished elsewhere to complete their academic and career goals.

Discussion and Conclusion

As we continue analysis, we are cognizant that while these findings highlight key insights, they also underscore the necessity for future research focused on enhancing support initiatives that broaden participation and facilitate the transition of community college students into the STEM educational pipeline and ultimately into industry roles. Throughout our continued analysis of the data we are intentionally coding lessons that that might inform institutional policy and practice. Through this research, the Community College S-STEM Network (CCSN) aims to develop and disseminate knowledge that will continuously inform researchers and practitioners about the decision-making processes and pathways of academically talented, low-income STEM students, thereby contributing to a more equitable and effective STEM workforce development strategy.

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