COMMUNITY COLLEGE S-STEM NETWORK

Literature Brief

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STEM Mentorship in Community College: Building Pathways for Success

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Introduction

Community colleges play a critical role in advancing science, technology, engineering, and mathematics (STEM) education, particularly for students from diverse backgrounds and nontraditional educational pathways. Yet the retention and success rates of STEM students at community colleges remain persistent challenges. Mentorship, both academic and professional, has emerged as a key strategy to address these challenges. This brief examines various mentoring models to highlight the importance of mentorship in STEM pathways at community colleges and help institutions develop mentoring programs that best support student success in STEM fields.

The Role of Mentorship in STEM Pathways

Mentorship in STEM provides guidance, support, and professional connections that are particularly vital in community colleges, where students face unique barriers such as financial constraints, family obligations, and limited access to resources. Mentoring relationships have been shown to foster a sense of belonging, improve academic performance, and increase persistence to graduation. Mentoring is especially important for STEM students as it connects them with faculty, peers, and professionals, fostering a network of support that is fundamental to student success.[1] These personal connections allow students to develop professional identities within their fields, a critical step for STEM students aiming to transfer to four-year

[1] Kobulnicky, H. A., & Dale, D. A. (2016). A community mentoring model for STEM undergraduate research experiences. Journal of College Science Teaching, 45(6), 17–23.

institutions.[2] In this context, students both receive advice and become integrated into the larger STEM community, boosting self-efficacy and commitment to their educational goals.[3]

Types of Mentorship Models in Community College

Various mentoring models have been implemented across community colleges to support STEM students. This section provides brief descriptions of five of these models.

STEM E-Mentoring for Students with Disabilities

Research indicates that STEM e-mentoring, a form of online mentoring, has been particularly beneficial for community college students with disabilities. Gregg et al.[4] found that STEM e-mentoring provides a flexible platform for students to connect with mentors without geographic or physical barriers, offering an essential avenue for students who might otherwise struggle to access traditional face-to-face mentoring. Critical areas of development for STEM students are to include the environments and social media tools; the importance of practicing e-learning embedded through their programs.

STEM Research Mentoring

Undergraduate research experiences play a pivotal role in the academic and professional development of community college STEM students. Marciniak[5] highlights the value of mentoring STEM research projects at community colleges, which provides students with hands-on experience that aligns with their academic interests and future career goals. Research mentors guide students through the research process, from hypothesis formation to data analysis, helping them build skills that are essential for success in both academic and professional STEM careers.

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[2] Packard, B. W. L., Gagnon, J. L., LaBelle, O., Jeffers, K., & Lynn, E. (2011). Women's experiences in the STEM community college transfer pathway. Journal of Women and Minorities in Science and Engineering, 17(2).

[3] Amelink, C. T., Artis, S., & King Liu, T. J. (2015). Examining the self-efficacy of community college STEM majors: Factors related to four-year degree attainment. Community College Journal of Research and Practice, 39(12), 1111–1124.

[4] Gregg, N., Wolfe, G., Jones, S., Todd, R., Moon, N., & Langston, C. (2016). STEM e-mentoring and community college students with disabilities. Journal of Postsecondary Education and Disability, 29(1), 47–63.

[5] Marciniak, M. A. (2020). Mentoring STEM undergraduate research projects in a large community college. Primus, 30(7), 777–789. https://doi.org/10.1080/10511970.2019.1639227

Mentoring in Economically Disadvantaged Communities

In rural and economically disadvantaged communities, students often lack the resources and networks accessible to their counterparts at more affluent institutions. Rivera et al.[6] examine a mentoring program at a community college in a disadvantaged rural setting and find that mentorship is critical for providing students with the guidance and confidence they need to succeed in STEM fields. The college's mentoring program not only helped students navigate their academic paths but also connected them with professionals in their fields, improving their access to internships and job opportunities.

Guided Mentorship Programs

Guided mentorship programs that integrate students into communities of practice have shown promising results in fostering STEM success. Dancz et al.[7] examine a program at a two-year community college where structured mentorship was embedded into the curriculum, ensuring that all students received consistent, personalized support. This model improved academic outcomes and strengthened the social community of STEM students—a critical factor in retention.[8]

Social Community in STEM Mentoring

Research encompassing the general field of STEM education underscores the role of social community in the success of STEM mentoring programs. Mentoring programs that create a sense of belonging and promote integration into a supportive network of peers, faculty, and professionals are particularly beneficial for racially minoritized STEM students.[9] These social communities provide students with a sense of purpose and validation within their chosen disciplines, which are essential for maintaining motivation and perseverance.

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[6] Rivera, S., Knack, J. M., Kavanagh, K., Thomas, J., Small, M. M., & Ramsdell, M. (2019). Building a STEM mentoring program in an economically disadvantaged rural community. Journal of Educational Research and Practice, 9(1), 29. https://doi.org/10.5590/JERAP.2019.09.1.29

[7] Dancz, C. L., Adams, E. A., Haden, C., Ahn, Y., Willis, K., & Craig, D. (2021). Implementation of a guided mentorship program in a STEM community of practice at a two-year college [Conference presentation]. 2021 ASEE Virtual Annual Conference Content Access, Virtual Conference. https://peer.asee.org/implementation-of-a-guided-mentorship-program-in-a-stem-community-of-practice-at-a-two-year-college.pdf

[8] Mondisa, J. L., & McComb, S. A. (2015). Social community: A mechanism to explain the success of STEM minority mentoring programs. Mentoring & Tutoring: Partnership in Learning, 23(2), 149–163. https://psycnet.apa.org/doi/10.1080/13611267.2015.1049018

[9] Mondisa, J. L., & McComb, S. A. (2015). Social community: A mechanism to explain the success of STEM minority mentoring programs. Mentoring & Tutoring: Partnership in Learning, 23(2), 149–163. https://psycnet.apa.org/doi/10.1080/13611267.2015.1049018

Challenges and Opportunities for Improvement

While studies show mentorship improves community college STEM student outcomes, challenges remain. Limited resources, lack of training for mentors, lack of or limited connection to industry, and the increasing demand for support services can strain mentorship programs at community colleges. Research by Petrucci and Rivera-Figueroa[10] suggests that access to faculty mentoring can be inconsistent across colleges. For example, faculty at urban Hispanic-serving community colleges tend to have higher-than-average teaching loads, which could limit time for individualized student support.

Conclusion

Mentorship plays a vital role in supporting STEM students at community colleges by helping them overcome challenges and build pathways to success. By providing personalized, professional, and peer-based support, mentorship programs can foster or contribute to a sense of belonging and enhance retention rates. Mounting evidence suggests community colleges should prioritize mentorship as a core component of STEM education. This can be achieved by securing funding for mentorship programs, training faculty mentors, and leveraging technology to extend the reach and impact of mentoring efforts. Additionally, fostering partnerships with local industries and universities can help provide students with real-world STEM experiences, thereby strengthening their professional networks. Community colleges should continue to innovate and invest in comprehensive mentorship structures that can meet the diverse needs of STEM students, ensuring they have the resources they need to persist and thrive.

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[10] Petrucci, C., & Rivera-Figueroa, A. (2022). STEM faculty mentoring and advising at an urban Hispanic-serving community college. Community College Journal of Research and Practice, 47(11), 659–677. https://doi.org/10.1080/10668926.2022.2056549