COMMUNITY COLLEGE
S-STEM NETWORK

FOSTERING STEM SUCCESS IN COMMUNITY COLLEGES: THE INTEGRATION OF CULTURALLY RELEVANT RESPONSIVE PEDAGOGY AND COMMUNITY CULTURAL WEALTH MODELS FOR STUDENTS

DR. MARIA LUZ ESPINO
EDUCATION AND EMPLOYMENT RESEARCH CENTER
RUTGERS, STATE UNIVERSITY OF NEW JERSEY

Fostering STEM Success in Community Colleges:

The Integration of Culturally Relevant Responsive Pedagogy and Community Cultural Wealth Models For Students

Maria Luz Espino

Rutgers University

Abstract

This qualitative study explores the ways in which culturally relevant pedagogy (CRP) and community cultural wealth (CCW) models are used to support underserved students in community college STEM programs, specifically within Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM) initiatives. Drawing on in-depth interviews with eight S-STEM students at Holyoke Community College (HCC), the study examines how CRP and CCW frameworks contribute to students' success and academic decision-making. Findings indicate that intentional integration of CRP in STEM environments is crucial for sustaining student belonging and validating their cultural identities. The study reveals that HCC's STEMinar successfully fostered an inclusive, supportive community where diverse perspectives were celebrated. By embedding CRP and CCW into the curriculum and providing tailored academic resources, the college enhanced students' academic persistence in STEM majors. These findings underscore the importance of creating culturally responsive spaces in STEM scholarship programs to improve retention and success among underserved student populations.

Keywords: community college, STEM, S-STEM, culturally relevant pedagogy, community cultural wealth, Holyoke Community College

Fostering STEM Success in Community Colleges: The Integration of Culturally Relevant Responsive Pedagogy and Community Cultural Wealth Models For Students

Both student and economic demands for higher education programs in science, technology, engineering, and mathematics (STEM) fields have expanded significantly over the past two decades. Community colleges play a vital role in meeting these demands by expanding access to higher education through open enrollment, affordable tuition, and robust support services. They serve as powerful pathways for students whose talents have been historically overlooked or underserved by traditional systems—students who bring rich experiences, resilience, and diverse perspectives to higher education (Funk & Parker, 2018). As a result, community colleges are uniquely positioned to address the underrepresentation of these groups in STEM fields, fostering diversity and inclusion in disciplines that are vital to the future workforce (Reyes, 2011; Rodriguez et al., 2019; St. Rose & Hill, 2013; Tsapogas, 2004).

This study demonstrates that integrating culturally relevant pedagogy (CRP) and community cultural wealth (CCW) models into community college STEM programs—specifically, those supported by a Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM) program at Holyoke Community College (HCC)—is essential for fostering a sense of belonging, supporting academic decision-making, and enhancing the retention and success of underserved students in STEM fields. By creating intentional, culturally responsive spaces within STEM programs, colleges can validate students' cultural identities, provide necessary academic resources, and ultimately contribute to more equitable educational outcomes. To explore this integration, the study is guided by the following research questions:

1. How do specific components of the HCC S-STEM Scholars STEMinar (STEMinar) influence students' decisions to persist in a STEM pathway?
2. In what ways does the integration of culturally responsive pedagogy and community cultural wealth models into the STEM seminar influence students' decision-making?

The S-STEM Scholars Seminar Program at Holyoke Community College

At HCC, the STEMinar was a central component of a comprehensive STEM Equity program designed to support and empower students in populations historically underserved in STEM fields. This one-credit seminar was exclusively offered to students who had been formally accepted into the National Science Foundation–funded S-STEM Scholars program, which aims to reduce financial barriers while enhancing academic and professional pathways in STEM (Herbaut & Geven, 2020). The STEMinar provided a structured, semester-long experience in which students engaged in weekly sessions that combined academic enrichment with personal and professional development. Students assisted in developing these sessions by providing their input into the syllabus. STEMinar components were primarily focused on student-led discussions on issues and topics in STEM, group challenges, an exploration of students' CCW, and various opportunities for civic engagement and undergraduate research. They also included guest speakers from various STEM industries and academia, interactive technical and academic success workshops, mentoring, and opportunities for scholarly student presentations.

HCC designed the STEMinar to support student development by combining academic and professional preparation with structured opportunities for peer connection and faculty engagement. It integrated elements such as community-building, mentorship, and identity exploration, offering students a dedicated space to engage with STEM through a lens that

acknowledged their lived experiences. Mentorship relationships were formalized through the STEMinar that paired scholars with faculty and industry representatives who guided them through the challenges of navigating STEM education. As students advanced through the program, they took on increasingly active leadership and mentorship roles, creating a sustainable, student-centered support network. In this way, the seminar fostered a strong sense of community and belonging beyond exposure to disciplinary content.

A distinguishing feature of the seminar was its use of CRP and CCW frameworks. While these approaches were not typically embedded in students' other STEM courses, HCC staff, faculty, and program director designed the seminar to provide a space where students could examine how their backgrounds, values, and aspirations intersected with their academic and career goals. This was accomplished through structured activities such as reflective writing and small group discussions. The seminar culminated with a Cultural Wealth STEM Narrative presentation in which students were encouraged to consider their intersecting identities within STEM fields and articulate connections between their personal experiences and their professional pathways.

STEMinar's curriculum design encouraged students to engage with concepts like navigational capital—the skills of maneuvering through social institutions—and aspirational capital—the ability to hold onto hope in the face of structured inequality, often without the means to make such dreams a reality—as part of their academic development (Yosso, 2005). Assignments such as the CCW wheel, where students discussed their backgrounds in relation to the CCW framework, and narrative presentation served as tools for making these connections explicit, fostering a learning environment that invited both personal reflection and academic growth within the context of STEM.

Theoretical Frameworks

This analysis of the HCC STEMinar is grounded in two complementary theoretical frameworks: culturally responsive pedagogy and community cultural wealth. Together, these frameworks provide insight into and ways to respond to the complex challenges faced by underserved students in STEM and offer asset-based strategies to support these students' persistence, agency, and success in community college settings.

Culturally Responsive Pedagogy

Culturally responsive pedagogy calls for teaching approaches that affirm students' cultural identities and promote academic excellence alongside critical social awareness (Gay, 2018). Rather than centering traditional, hierarchical models of knowledge transmission, CRP emphasizes the importance of making learning deeply responsive to students' lived realities, social contexts, and cultural knowledge systems (Gay, 2018; Ladson-Billings, 1995). In the context of the STEMinar at HCC, CRP offered a powerful lens for understanding how to design and deliver learning experiences that reflect the diverse identities of the cohort. Guest lectures, peer-led discussions, and mentoring relationships were not just academic touchpoints; they were opportunities for students to engage in critical reflection about their place in STEM fields and about the broader societal structures that shaped access to these careers. For many students in the program, who often identified as first-generation, low-income, and/or racially marginalized, CRP created space to interrogate and navigate the structural inequities embedded in both higher education and the STEM workforce. This framework supported the development of a critical

consciousness, empowering students not only to succeed within existing systems but to envision their role in transforming them.

Community Cultural Wealth

Complementing CRP, Yosso's (2005) CCW framework shifts the narrative about what constitutes valuable knowledge in educational settings. Whereas dominant models often view students from historically marginalized backgrounds through a deficit lens, CCW recognizes the rich array of social, cultural, linguistic, aspirational, navigational, and familial capital that these students carry with them into academic spaces.

Applied to the HCC STEMinar CCW helped explain how students are able to thrive academically *because* of, not in spite of, their lived experiences and cultural assets. Many STEMinar students navigated complex responsibilities while remaining committed to their educational and career goals. Rather than seeing these demands as barriers, the seminar structure invited students to bring their full identities into the learning process. The program's design intentionally drew on students' community-based knowledge and leadership potential.

Importantly, the CCW framework also draws attention to the role of institutional structures. While community colleges like HCC serve as essential access points for diverse learners, they often face constraints in fully supporting the unique needs of underserved STEM students. By embedding CCW into the pedagogical and programmatic design of the STEMinar, the S-STEM initiative resisted these limitations, helping to cultivate an inclusive environment where students' strengths were recognized, validated, and developed.

Together, CRP and CCW provide a powerful dual lens for interpreting the goals and outcomes of the S-STEM Scholars Seminar. They affirm that fostering equity in STEM

education requires more than academic support; it demands intentional practices that value students' cultural identities, support their leadership development, and encourage them to engage critically with the systems they are preparing to enter and transform.

Methods

This qualitative study is part of a larger case study that investigates the HCC STEMinar and how HCC incorporates CRP and CCW within it. We draw on data from interviews with the eight students in that study who were enrolled in the STEMinar at HCC at the time of data collection or had been enrolled previously. We also conducted a document analysis of the STEMinar syllabus. These methods were chosen to intentionally explore the in-depth experiences of students and staff involved in the seminar (Seidman, 2006). Collecting detailed qualitative data through semi-structured interviews and analyzing the seminar syllabus allowed for a comprehensive understanding of both the seminar's content and the ways students interacted with and benefited from it.

Participants, including students and staff, were recruited via email through an invitation to participate in an interview. One-on-one interviews were scheduled with a member of the research team using purposeful sampling. The interviews were conducted via Zoom, audio-recorded, and subsequently transcribed. NVivo software was used to code the transcripts both inductively and deductively.

Findings

Guided by our research questions, this study examines specific components of Holyoke Community College's S-STEM Scholars Seminar, particularly its integration of culturally

relevant pedagogy and community cultural wealth models, and the seminar's influence on students' decisions to persist in STEM pathways. Our findings demonstrate three interconnected outcomes that played critical roles in shaping the experiences of the students in our study:

1) The development of a sense of belonging and community,
2) The engagement of students through culturally responsive and asset-based pedagogies, and
3) The formation of positive STEM identities and self-efficacy.

Sense of Belonging and Community

The STEMinar fostered a critical community that helped students feel like they belonged in STEM (Meza, 2025) through intentional assignments and activities and the nurturing of in-class connections. Evidence of this sense of belonging and community emerged as a theme in student narratives, which focused on how the seminar's structure and discussions transformed the students and their commitment to engagement. Alma shared how the seminar became a safe and affirming space that contrasted starkly with her previous school experiences:

> I had this one set vision of how people in a school act, like, this particular way, and "They're gonna treat me like this." But you go into this seminar, and it's the opposite of my high school. It's, like, a bunch of adults. They have goals, dreams. They treat you with respect. They're like your friends, and they love you, and they want the best for you. And you can all bond on, like, what you're doing. Everyone's a little different, but there's just the best people ever. I can't stress that enough.

For Alma, the supportive and respectful environment created by her peers and faculty in the seminar provided her with a sense of belonging that she had never experienced before. It was no longer about feeling judged or isolated; instead, she found a place where she could be seen as an adult among peers who shared her academic ambitions. Similarly, Jim shared, "I love the feeling of community there, and talking and sharing different ideas. That is awesome to me." Dolores also emphasized the powerful impact of the seminar's diversity and inclusivity when it came to sharing in class with peers and others:

> I would say the seminar is the best thing about HCC . . . because you could meet 30 to 50 different people all from different STEM disciplines and get a really rounded idea of what STEM is like . . . It's not just, like, rocket scientists, you know, glass beakers. It's also, like, health care. It's also anthropology, you know what I mean? So I think that the diversity of the community was something that helped me to keep me engaged for sure.

For Dolores, meeting STEM scholars from a broad range of disciplines expanded her understanding of what STEM is and what it can be, helping her to move beyond narrow or stereotypical representations of STEM fields. The diversity of perspectives and fields represented in the seminar kept her engaged and provided an opportunity to see herself reflected in a wider STEM community.

These examples highlight how the seminar not only created a strong sense of belonging but also expanded students' perceptions of what it means to be part of STEM. The welcoming environment encouraged students to share their goals and ideas, fostering a supportive

community that counteracted the feelings of isolation or alienation that typically hinder the engagement and persistence of marginalized students in STEM pathways.

Engaged Learning Through CRP and CCW

CRP and CCW are culturally grounded approaches that validate students' diverse backgrounds and equip them to navigate challenges and to recognize their own strengths as assets in STEM fields. The STEMinar's discussion-based and project-based approach empowered students to take ownership of their learning by intentionally moving beyond memorization to meaningful dialogue and exploration. Jim articulated the unique value of these discussions and their transformative power:

> The discussions, to me, were what makes the seminar . . . incredibly, incredibly important. I would always advocate for more discussion time. The community cultural wealth is incredibly important. I've just seen so much being in the seminar. I've taken the course three times, and you know, it's different every time. The resources, if people choose to dig into them, are incredibly useful.

For Jim, the STEMinar provided far more than academic content; it provided the space he needed to continue to grow and find new layers of understanding himself and others in the STEM community. His repeated engagement in the seminar underscores how this model of engaged learning offers a dynamic and evolving experience that resonates deeply with students' ongoing development. Jim emphasized how CCW gave him the language and framework to see his own life experiences as assets rather than barriers:

> The community cultural wealth was very expansive, because I hadn't looked at things through that framework. I already had seen the aspirational capital, but it helped me put it in a structure that was laid out before me, and I really appreciated that. It helped me to look at where I could do some work. And helped me to understand who I was as a person. I do have a lot of navigational capital because I advocate for myself a lot.

For Jim, CCW was more than a theoretical framework; it was an active opportunity for reflection and growth. It allowed him to reframe his assertiveness, self-advocacy, and life experiences as powerful tools for navigating STEM spaces. The seminar's explicit integration of CCW helped students like Jim see how their backgrounds were valuable forms of cultural capital that enriched their STEM journeys.

Bobby also highlighted how the seminar's approach to discussion expanded his thinking and pushed him to engage with STEM in new ways:

> The current form [seminar sessions] have taken is a big highlight, where it's very philosophical. It's very opinionated, but it's also not argumentative. And it's different than a typical class where you're just talking about historically proven facts. Instead, we're talking about current events, how it affects our lives, how it affects the future, or education or whatever. It's really great . . . And it's slowly grown. But I really liked those discussions. That was a big highlight.

For Bobby, the shift from the traditional learning model's focus on a static set of "historically proven facts" to one that integrated current events and personal experiences opened up new ways of learning that allowed him to see STEM as relevant and responsive to the world around him. Seminar discussions created a sense of agency and relevance, bridging the gap between STEM content and real-world contexts that matter to students' lives.

STEM Identity Development and Self-Efficacy

The powerful sense of belonging and community fostered by the S-STEM Scholars Seminar laid the foundation for the development of a positive STEM identity (Carlone & Johnson, 2007) and greater self-efficacy (Bandura, 1982) among participants. STEM identity is a student's ability to be a person who is interested in, possesses the relevant knowledge and skills in, and engages in STEM (Carlone & Johnson, 2007; Espino et al., 2024 Rodriguez et al., 2019). Self-efficacy is an individual's belief in their ability to complete actions and to persist despite difficulties (Bandura, 1982). For many students, this identity shift began with the validation they received simply by being part of the S-STEM program. For example, Bobby reported, "When I was accepted into that program, it was very empowering." He further noted gaining a sense that, "'Oh, wait, I can do something!' . . . It felt good." For him, the act of being recognized as an S-STEM Scholar both affirmed his place in STEM and introduced a view of himself as someone capable of thriving in the field. This newfound sense of possibility was echoed across other students' experiences.

In addition to creating a space where students felt affirmed and supported, the seminar challenged students to rethink their own capabilities and potential within STEM fields. This led

students to cultivate newfound confidence and resilience. Dolores shared how important it was that the seminar allowed her to find herself:

> A big portion of what helped me was in the seminar, they had this portion that was, like, talking about how there's no such thing as being naturally good at anything. And that helped me a lot because I really had that thought in my mind. And I think it was probably due to my upbringing. You know, "There's things you can do, and there's things that you can't do" versus "If you are interested enough, you can do anything."

For Dolores, the messages she received in the seminar directly challenged the idea that STEM students and STEM success required a "natural talent." She was able to connect and show how the seminar allowed her to recognize herself as a STEM scholar. The seminar explicitly challenged deficit narratives (e.g., "natural talent"), helping students like Dolores reframe their STEM identity and believe in their own potential. This explicit reframing of STEM identity was a crucial step in helping Dolores and her peers build confidence and see themselves as scholars in their own right.

Alma provided an emotional reflection on how she used to feel isolated, or "closed off," and how the seminar's approach provided space for her to connect with her identity:

> I feel like socially, I'm a lot more developed. I think I needed that, honestly. It built basically a foundation of my life . . . It definitely got me to navigate my college . . . It just made me fall in love with learning again, like, gave me back the core of my soul. I'm a learner, I always have been. I lost it. And then [the seminar] just gave it back to me.

Alma's story shows how the seminar helped her move from feeling isolated and disconnected to reclaiming her identity as a lifelong learner and as someone who belongs in STEM. She was very vulnerable in sharing how the seminar allowed her to be recognized and showed her she was competent and capable of achieving her goals.

These students' experiences demonstrate that the HCC S-STEM Scholars Seminar's focus on identity and self-efficacy was more than just a programmatic feature; it was a transformative force for each student. By fostering a sense of belonging and community, directly challenging deficit narratives, and validating students' aspirations, the seminar helped students build a resilient and empowered STEM identity. This transformation in STEM identity and self-efficacy sets the stage for the third major finding of this study—the way in which the seminar's integration of CRP and CCW provided students with the frameworks and tools they needed to persist in STEM.

Discussion

This study examines how specific components of HCC's STEMinar, particularly its integration of CRP and CCW, influenced students' decisions to persist in STEM pathways. We have identified three interconnected outcomes: the development of a sense of belonging and community, the formation of positive STEM identities and self-efficacy, and the engagement of students through culturally responsive and asset-based pedagogies. Rather than operating independently, we find that these outcomes function as mutually reinforcing elements within an integrated system of support.

The Interconnected Nature of Belonging, Identity, and Engagement

While existing literature often treats belonging, STEM identity, self-efficacy, and engagement as discrete constructs, our findings suggest they operate synergistically in practice. The STEMinar created conditions where these elements activated and strengthened one another through a dynamic process. Students consistently described how feeling welcomed and connected (belonging; Strayhorn, 2018) created the psychological safety necessary to explore and reimagine what it means to be a "STEM person"—a process Carlone & Johnson (2007) call identity development. This identity work, in turn, challenged deficit narratives and allowed students to recognize their capabilities, thus gaining the feeling of self-efficacy (Bandura, 1982) that allowed them to sustain their motivation to engage deeply with course content and persist in their STEM pathways.

The integration of CRP and CCW frameworks appears to be the mechanism that activates this interconnected process. By designing assignments like the Cultural Wealth STEM Narrative and facilitating discussions that connected STEM concepts to lived experiences, the STEMinar did not address belonging, identity, or engagement in isolation. Instead, these pedagogical choices simultaneously affirmed students' cultural backgrounds, invited critical reflection on their relationship to STEM, and demonstrated the relevance of their knowledge and experiences to the field. Students were not passive recipients moving through a linear progression of outcomes; rather, they actively constructed meaning across these dimensions in ways that were mutually reinforcing.

For example, when students brought their full selves into the classroom through culturally responsive assignments, they experienced validation that fostered belonging. This sense of inclusion then created space for students to critically examine and redefine STEM

identity on their own terms, moving beyond narrow definitions tied to innate talent. As students developed more expansive and personally meaningful STEM identities, their self-efficacy grew; they began to see themselves as capable contributors rather than outsiders. This increased confidence and sense of legitimacy, in turn, sustained deeper engagement with course material and motivated persistence even when facing challenges. The cycle continued as engaged participation further strengthened community bonds and reinforced belonging.

This dynamic stands in contrast to interventions that target academic preparation or financial support alone. While those supports are necessary, they may not be sufficient if they do not also address the affective, identity-based, and social dimensions of STEM persistence. The STEMinar demonstrates that when institutions create intentional spaces where students can connect their cultural knowledge, personal experiences, and academic learning, they unlock a more powerful and sustainable pathway to retention and success.

Theoretical and Practical Contributions

This study contributes to a growing body of research that calls for more holistic, equity-centered approaches in STEM education, particularly in two-year institutions. By demonstrating how CRP and CCW frameworks can be operationalized in a structured seminar format, we show that culturally responsive practices can serve dual roles: affirming identity and deepening academic engagement (Gay, 2018; Yosso, 2005). The STEMinar provided students with an intentional space to connect their full selves to their STEM curriculum and careers—space that did not exist in their other classes.

Importantly, the STEMinar provided a dedicated environment where students could critically reflect on their roles in STEM and develop tools to navigate and challenge structural

barriers. By integrating academic rigor with community-building and mentorship, HCC's STEMinar reflected a holistic approach to equity in STEM education, preparing students to thrive both in college and in their future careers. This model suggests that effective STEM retention programming must attend to the complex interplay between belonging, identity, and engagement rather than treat them as separate targets for intervention.

Implications for Research and Practice

Our findings suggest several implications for community colleges and other institutions aiming to increase STEM persistence among underrepresented students.

Integrate CRP and CCW into STEM curriculum design.

STEM curricula should create intentional opportunities for students to connect academic learning with their cultural backgrounds and lived experiences. Assignments that prompt students to reflect on their personal and social identities, like cultural wealth narratives or community-based case studies, can foster deeper engagement and affirmation. When students see their cultural knowledge as relevant to STEM, they are more likely to persist. HCC's STEMinar demonstrates how embedding CRP and CCW into assignments and discussions simultaneously enhances students' sense of belonging, supports identity development, and increases academic engagement; our study suggests that these frameworks suggest that they are particularly powerful because they address multiple dimensions of student success at once.

Develop STEM community-based seminars for identity exploration and belonging.

Creating seminar spaces that blend academic content with critical dialogue around identity, culture, and STEM can serve as powerful interventions for student success. These seminars offer students a space to process their experiences, engage in peer support, and critique systemic inequities. As demonstrated in this study, students can use these settings to redefine their place in STEM and gain confidence in navigating the academic system and their career interests. Implementing structured spaces where identity development is explicitly supported using frameworks such as CRP, CCW, and reflective dialogue can be a powerful lever for students' success as they navigate STEM fields. Given that some students in the seminar revisited and expanded their learning within these frameworks across multiple semesters, creating consistent opportunities to do so may offer a sustained pathway for growth and persistence.

Promote institution-wide equity commitments in STEM.

Efforts to support underserved students should not be siloed within individual programs. This work must be embedded across departments and services. CRP and CCW frameworks can inform admissions, advising, extracurricular programming, and instructional design. Institution-wide alignment ensures that students encounter consistent messages of affirmation, validation, and support throughout their STEM journey.

Conclusion

Community colleges can reshape STEM pathways for underrepresented students by affirming identity, validating lived experiences, and cultivating a sense of belonging. This study highlights how HCC intentionally integrated CRP and CCW into academic structures (i.e.,

through seminars, curriculum, mentorship, and career assistance) to support students' personal, academic, and professional development in interconnected ways. This integrated approach allowed students in our study to view themselves as capable and valued contributors to STEM, demonstrating that belonging, identity, self-efficacy, and engagement are not independent outcomes but mutually reinforcing dimensions of persistence.

Future research should explore how these practices can be scaled or adapted across different institutional contexts and student populations. Longitudinal studies may also shed light on the lasting impact of culturally responsive programming on students' transfer rates, degree completion, and entry into STEM careers. Additionally, research examining the specific mechanisms through which CRP and CCW frameworks simultaneously activate multiple dimensions of student success could further refine our understanding of effective equity-centered interventions.

Embedding culturally responsive practices into the fabric of STEM education is not only an equity imperative; it is essential for the growth and development of the STEM workforce. As STEM fields continue to grow and evolve, colleges must prioritize the voices and experiences of underserved students to ensure that their experiences enrich STEM fields and contribute to a diverse and innovative workforce. These recommendations offer guidance for institutions seeking to enhance their STEM programs and to help students, regardless of background, succeed in their STEM education and become active members of the STEM workforce.

Acknowledgments

Special thank you to the *STEM Scholars' 2.0 SCoRE: STEM Cohorts for Research and Engagement* (NSF Grant No. 2030890). The author acknowledges the Holyoke Community College team including Ileana Vasu, who served as key program designer and Principal Investigator from 2020–2024 and worked in collaboration with Steven Winters (Co-PI 2020-2021), Vanessa Martinez (Co-PI, 2020-present) and Laurel Carpenter (co-PI 2020-2024, and current PI). Appreciation is also extended to the STEMinar mentors (past and present) and participating students. Additional thanks are extended to Angel Butts of The Word Angel LLC for editorial assistance and to Laurel Carpenter, Dr. Elizabeth Meza and Dr. Debra Bragg for their internal review of this paper. At EERC, I would like to thank Sam Scovill for their research support through the various phases of this project and Melissa Quaal for professional design and formatting. This material is based upon work supported by the National Science Foundation under Grant Nos. 2030890, 2224623, and 2224671. Any opinions, findings, and conclusions or recommendations expressed in this material do not necessarily reflect the views of the National Science Foundation.

References

Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, *37*(2), 122. https://psycnet.apa.org/doi/10.1037/0003-066X.37.2.122

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. https://doi.org/10.1002/tea.20237

Espino, M.L., Stevens, A., Rodriguez, S.L., & Le, B.D. (2024). Exploring how socioeconomic status and the S-STEM scholarship influence engineering identity development for community college students. *Community College Journal of Research and Practice, 48(*3), 175-180. https://doi.org/10.1080/10668926.2023.2293304

Funk, C., & Parker, K. (2018, January 9). *Women and men in STEM often at odds over workplace equity*. Pew Research Center. https://www.pewresearch.org/social-trends/2018/01/09/women-and-men-in-stem-often-at-odds-over-workplace-equity/

Gay, G. (2018). *Culturally responsive teaching: Theory, research, and practice*. Teachers College Press.

Herbaut, E., and Geven, K. 2020. What works to reduce inequalities in higher education? A systematic review of the (quasi-)experimental literature on outreach and financial aid. *Research in Social Stratification and Mobility, 65*. https://doi.org/10.1016/j.rssm.2019.100442

Ladson-Billings, G. (1995). Toward a theory of culturally relevant pedagogy. *American educational research journal*, *32*(3), 465–491. https://doi.org/10.3102/00028312032003465

Meza, E. (2025). *Sense of belonging in community college STEM: Why it's important and how to create more*. Rutgers University, Education and Employment Research Center, Community College S-STEM Network. https://ccsstemnetwork.org/wp-content/uploads/2025/06/SSTEM_Sense-of-Belonging-Final.pdf

Reyes, M. (2011). Unique challenges for women of color in STEM transferring from community colleges to universities. *Harvard Educational Review, 81*(2), 241–263. https://doi.org/10.17763/haer.81.2.324m5t1535026g76

Rodriguez, S. L., Hensen, K. A., & Espino, M. L. (2019). Promoting STEM identity development in community colleges & across the transfer process. *Journal of Applied Research in the Community College, 26*(2), 11–22.

Seidman, I. (2006). *Interviewing as qualitative research: A guide for researchers in education and the social sciences*. Teachers College. https://www.researchgate.net/file.PostFileLoader.html?id=563ce2da6225ff3cae8b4590&assetKey=AS%3A292843798188032%401446830810198

Strayhorn, T. L. (2018). *College students' sense of belonging: A key to educational success for all students.* Routledge. https://doi.org/10.4324/9781315297293?urlappend=%3Futm_source%3Dresearchgate.net%26utm_medium%3Darticle

St. Rose, A., & Hill, C. (2013). *Women in community colleges: Access to success*. American Association of University Women. https://files.eric.ed.gov/fulltext/ED546790.pdf

Tsapogas, J. (2004). *The role of community colleges in the education of recent science and engineering graduates* (Info Brief 04-315). Division of Science Resources Statistics, National Science Foundation. NCSES Web Archive. https://wayback.archive-

it.org/5902/20150628084151/http://www.nsf.gov/statistics/infbrief/nsf04315/nsf04315.pdf

Yosso, T. J. (2005). Whose culture has capital? A critical race theory discussion of community cultural wealth. *Race Ethnicity and Education, 8*(1), 69–91. http://www.tandfonline.com/action/showCitFormats?doi=10.1080/1361332052000341006