

## **Faculty Mentorship for Underserved Senior STEM Students: Insights From a Hispanic-Serving Institution**

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### **Abstract**

This paper reports the role of faculty mentorship in supporting underserved and low-income upper-division students in STEM fields at the largest undergraduate Hispanic-Serving Institution in the United States. The evaluation focused on 49 students in Fall 2024 and 39 in Spring 2025, all in their senior year and enrolled in one of three bachelor's programs: Data Analytics, Cybersecurity, or Information Systems Technology. Faculty mentorship was provided during the final two years of the students' programs, in addition to general academic advising. The evaluation examined changes in scholars' self-ratings of program and mentorship satisfaction, as well as confidence, sense of belonging, and perceived support. Comparisons by gender and degree program revealed no statistically significant differences across semesters in student perceptions, suggesting a consistent mentoring experience. Qualitative findings were gathered from a focus group and follow-up questionnaire with three faculty mentors—one from each program. Mentors described adaptive, student-centered approaches that included academic support, development of soft skills, and career preparation. They also emphasized building trust and tailoring guidance to individual student circumstances, such as employment demands and limited experience in professional environments. Faculty noted the positive impact of mentorship on student motivation and persistence, particularly for those navigating barriers like imposter syndrome or financial hardship. Recommendations included structured mentor training, access to industry professionals, and improved hands-on learning opportunities. Mentors also reported personal growth in teaching and advising through a deeper understanding of student needs. These findings provide practical insights for designing effective mentorship initiatives for underserved STEM students approaching graduation.

*Keywords:* faculty mentorship, underrepresented students, community college, computing education

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## Introduction

Mentorship is a critical mechanism for supporting underserved and low-income students in STEM pathways, particularly at Hispanic-Serving Institutions (HSIs) where many students balance academic, financial, and familial responsibilities. This research report highlights the role and impact of faculty mentorship within the Rebooting through EmTech Program (REP), an initiative supporting upper-division students in Data Analytics, Cybersecurity, and Information Systems Technology at Miami Dade College (MDC), the largest undergraduate HSI in the United States. The REP program integrates financial support, professional development, and structured faculty mentorship, offering a unique opportunity to study how individualized guidance influences academic outcomes, psychosocial development, and career readiness among students nearing graduation. This evaluation focuses on seniors nearing graduation and examines how mentorship relates to confidence, belonging, perceived support, and academic outcomes.

Drawing upon a comprehensive evaluation—including two semesters of scholar surveys, a faculty mentor focus group, follow-up mentor questionnaires, and regression analysis of academic datasets—this report provides detailed insights into how faculty mentorship strengthens students' confidence, learning experiences, and persistence. It further investigates faculty perspectives on mentoring, highlighting their strategies, challenges, and reflections on professional growth.

### STEM Faculty Mentoring in Computing and Technology

A substantial body of research confirms that faculty mentoring is a critical predictor of persistence and success in STEM disciplines. Mentored STEM students are more likely to develop strong scientific identities, engage in research opportunities, and persist through challenging coursework (Estrada et al., 2016; Estrada et al., 2018). In computing and technology fields specifically, mentoring relationships help students deepen technical mastery, contextualize theoretical knowledge through real-world applications, and understand pathways into competitive careers (Turner, 2023; Wimberly et al., 2022).

Faculty mentors who guide students through projects, certification pathways, and portfolio-building contribute significantly to students' readiness for the tech workforce. Effective mentoring in computing also includes feedback on professional materials (résumés, GitHub portfolios, LinkedIn profiles), guidance on industry expectations, and exposure to professional networks. These practices have been linked to improved self-efficacy and persistence among computing majors, particularly through mechanisms such as goal setting, normalization of struggle, and high-quality mentor-mentee interactions (Kuchynka et al., 2023).

### Mentoring Underserved and Underrepresented Students in STEM

Underserved and underrepresented students—including Black, Hispanic, first-generation, and low-income learners—face unique systemic barriers in STEM. These include limited access to academic resources, fewer opportunities for early exposure to STEM careers, financial pressures, and experiences of marginalization within academic settings. High-quality mentoring relationships can play a powerful role in mitigating these inequities (Byars-Winston & Dahlberg, 2019; McGee, 2019).

Culturally responsive mentoring has been shown to improve belonging, confidence, and persistence for underrepresented STEM students. Mentors who validate students’ cultural identities, acknowledge systemic barriers, and guide students in navigating institutional structures foster stronger academic and psychosocial outcomes (Morales et al., 2021; Pedersen et al., 2022). Among Latinx and Black students in particular, mentorship emphasizing encouragement, communication, and advocacy is associated with increased interest in graduate study and stronger commitments to STEM careers.

Research on HSIs shows that supportive relationships, community-building, and culturally aligned mentoring practices are central to promoting STEM success for Hispanic students. Such approaches underscore the importance of intentional practices that foster equity and meaningful learning experiences rather than merely enrolling high numbers of Hispanic students (McGee, 2019; Morales et al., 2021).

The present study contributes to this expanding literature by looking at faculty mentorship in computing-related bachelor's programs at an HSI. It provides empirical evidence on how mentorship shapes academic confidence, belonging, and career readiness among underserved senior STEM students.

### Program Overview

MDC enrolls a student body that is 73% Hispanic, 16% Black (non-Hispanic), 57% women, 68% low income, 35% ESL, 58% first-generation, and 54% age 21 or older. Nationally, MDC has the highest enrollment of Hispanic undergraduates (81,398) and ranks third in Black (non-Hispanic) undergraduate enrollment, reflecting its significant role in expanding access to higher education for historically underserved populations. In alignment with MDC’s mission to support its diverse and predominantly underserved student body, the REP program offers targeted financial, academic, and professional development support to help senior students in emerging technology bachelor’s programs thrive. A central component of the program is EmTech Connect, which pairs each scholar one-on-one with a dedicated faculty mentor who offers tailored academic and career guidance. Students further build their professional competencies through Savvy Tech Workshops that strengthen confidence, workforce readiness, and self-promotion. Career preparation is additionally supported through the Leadership Rotation Academy, which offers structured opportunities for undergraduate research, internships, and industry certification training, as illustrated in Figure 1.

**Figure 1**  
*REP Support Framework by Term and Activity Frequency*

Fall	Spring	Summer
<ul style="list-style-type: none"> <li>• Financial Literacy (1)</li> <li>• EmTech Connect (1–3)</li> <li>• Savvy Tech (3)</li> </ul>	<ul style="list-style-type: none"> <li>• Financial Literacy (1)</li> <li>• EmTech Connect (1–3)</li> <li>• Savvy Tech (3)</li> <li>• Tech Speaker Series (1)</li> </ul>	<ul style="list-style-type: none"> <li>• Leadership Rotation Academy Track (1)</li> </ul>

Designed to improve degree completion and workforce readiness, the REP program serves scholars who often identify as first-generation, low-income, adult learners, or students working full- or part-time jobs. Given these realities, faculty mentorship plays a critical role in supplementing traditional academic advising and helping students navigate personal, academic, and career obstacles.

### Methodology

The evaluation uses a mixed-methods approach to capture both the measurable outcomes of student experiences and the qualitative nuance of mentoring interactions, as summarized in Table 1.

These data sources provide a comprehensive foundation for examining both quantitative and qualitative aspects of the REP experience. Quantitatively, paired t-tests were conducted to examine semester-to-semester changes in confidence, support, belonging, and satisfaction, while multiple regression and logistic regression were used to assess predictors of GPA, course pass rates, and persistence. Qualitatively, inductive thematic analysis was applied to mentor responses to identify and synthesize themes related to mentoring strategies, challenges, student barriers, and mentor growth.

**Table 1**  
*Summary of Data Sources*

<b>Data Source</b>	<b>Description</b>	<b>Sample Size</b>	<b>Timing</b>
REP Scholar Survey	Online surveys assessing confidence, belonging, satisfaction, support, and mentoring experiences	N = 49 (Fall 2024); N = 39 (Spring 2025)	Fall 2024 & Spring 2025
Faculty Mentor Focus Group	Virtual discussion exploring mentoring strategies, student needs, and program improvements	2 faculty mentors + 1 written response	April 2025
Mentor Follow-Up Survey	Open-ended questionnaire elaborating on mentoring practices and challenges	3 faculty mentors	Spring 2025
Student Outcomes Data	Institutional data on GPA, course pass rates, and persistence	769–512 observations	Fall 2024–Spring 2025

### Results

#### REP Student Demographics

The demographic profile of REP scholars remained largely consistent across semesters. As shown in Table 2, the participants are predominantly male, with approximately half identifying as Hispanic/Latino(a/x). Racial and ethnic backgrounds were diverse overall. Employment patterns shifted in the spring, with increases in both full- and part-time work. Participation in professional development activities showed modest changes, with internships increasing while certification and undergraduate research involvement remained relatively stable.

**Table 2***Summary of REP Scholar Demographics (Fall 2024–Spring 2025)*

Category	Fall 2024 (N = 49)	Spring 2025 (N = 39)
<b>Gender</b>	Man: 35 (71.4%); Woman: 12 (24.5%); non-binary: 2 (4.1%)	Man: 28 (71.8%); Woman: 11 (28.2%); non-binary: 0 (0%)
<b>Race/Ethnicity</b>	Hispanic/Latino(a/x): 23 (47.9%); Black/African American: 11 (22.9%); Asian/Pacific Islander: 1 (2.1%); White: 0 (0%); Two or More Races: 13 (27.1%); Prefer not to say: 1 (2.0%)	Hispanic/Latino(a/x): 20 (51.3%); Black/African American: 8 (20.5%); Asian/Pacific Islander: 2 (5.1%); White: 1 (2.6%); Two or More Races: 8 (20.5%); Prefer not to say: 0 (0%)
<b>Employment Status</b>	Full-Time: 6 (12.2%); Part-Time: 0 (0%); Not Employed: 43 (87.8%)	Full-Time: 7 (17.9%); Part-Time: 7 (17.9%); Not Employed: 25 (64.1%)
<b>Professional Activities</b>	Internship: 6 (12.2%); Certification(s): 18 (36.7%); Undergraduate Research: 3 (6.1%)	Internship: 8 (20.5%); Certification(s): 12 (30.8%); Undergraduate Research: 2 (5.1%)

### Quantitative Findings

As summarized in Table 3, the quantitative analysis indicates that REP participation was associated with higher academic performance, particularly in overall pass rates, while GPA and persistence outcomes showed more modest or mixed patterns. While GPA results varied across semesters, the trend suggests potential academic benefits for REP scholars in Spring 2025. Persistence outcomes showed no meaningful differences, indicating that retention may depend on factors beyond the program's scope. Overall, the findings suggest to REP's potential effectiveness in improving academic outcomes for participating students.

**Table 3***Summary of Quantitative Findings*

Outcome Variable	Significant Predictors	Significance	Interpretation
Overall Pass Rate	REP Participation; Hispanic Identity	$p < .01$ ; $p < .10$	REP students performed better on average
Fall 2024 GPA	None	n.s.	No major differences detected
Spring 2025 GPA	REP Participation (modest)	$p < .10$	REP mentorship may support GPA gains
Persistence	None	n.s.	No predictors achieved significance

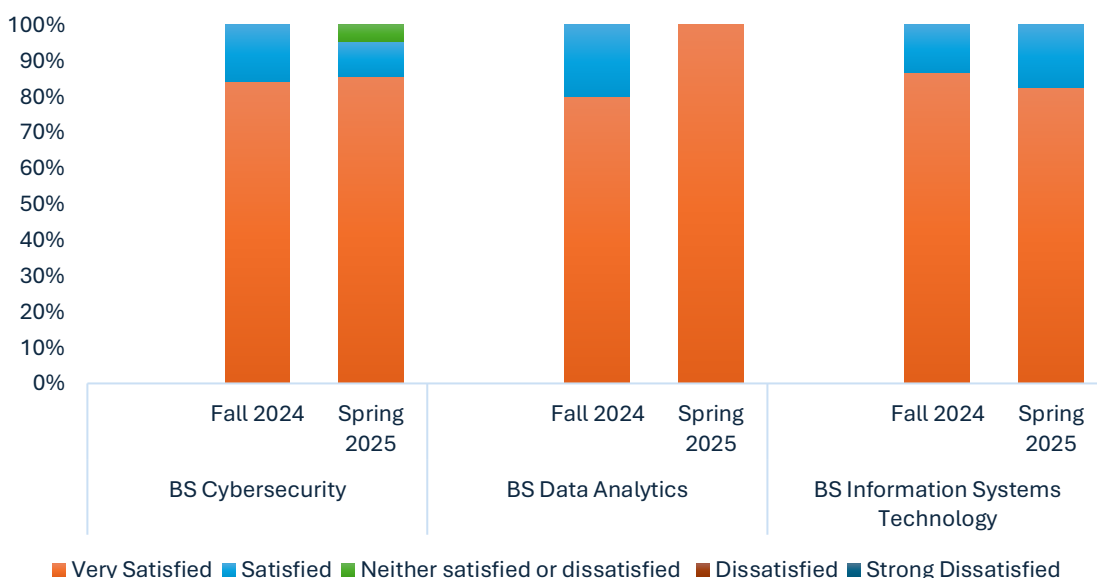
### Student Experiences With Faculty Mentorship

Survey data demonstrated that mentorship significantly shaped students' perceptions of their academic potential, sense of belonging, and confidence in technology-related tasks. In addition to quantitative ratings, students shared feedback that highlights the meaningful role of

mentorship. Students praised the REP program in many aspects and were interested in even more networking opportunities, mentorship, and resources. Several students also indicated that additional support related to certifications would be valuable, noting that “preparation materials for industry certification would be helpful.” These sentiments suggest that while mentoring experiences were overwhelmingly positive, scholars desired even more structured opportunities to connect with mentors and strengthen career preparation.

Across all three programs, REP scholars reported high satisfaction with faculty mentorship in both semesters. Overall satisfaction patterns by program and term are displayed in Figure 2, which shows consistently positive perceptions across semesters.

**Figure 2**  
*Mentoring Satisfaction by Degree Program and Semester (2024–2025)*



Further indicators of student perceptions—including confidence, faculty support, and belonging—are summarized in Table 4, which shows high and stable ratings across both semesters.

**Table 4**  
*Student Perception Summary*

Theme	Fall 2024	Spring 2025	Interpretation
Mentoring satisfaction	~98% satisfied	100% satisfied	High, stable satisfaction
Confidence in academic skills	94–100%	95–100%	Students felt academically capable
Faculty support	93.9%	100%	Students perceived active, consistent support
Belonging in major	98%	100%	Strong academic identity
Campus belonging	Slightly lower	Similar trend	Campus climate may limit belonging

Students frequently emphasized that consistent communication with mentors alleviated confusion about coursework, strengthened motivation, and provided clarity regarding post-graduate pathways. Key student challenges were:

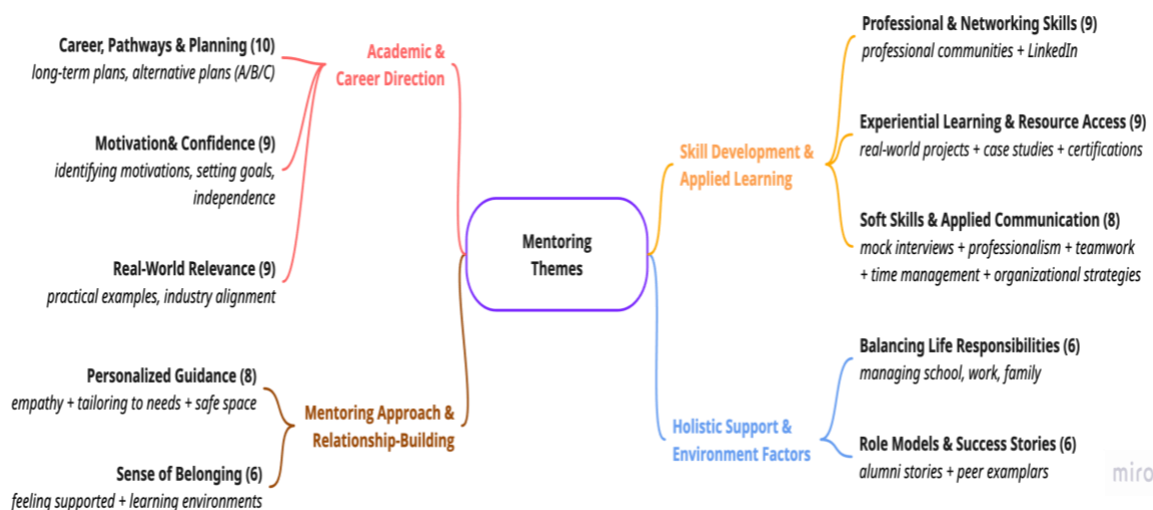
- Managing work shifts alongside full-time coursework
- Supporting family members or managing household responsibilities
- Financial insecurity, even with stipends
- Lack of confidence in soft skills such as communication or networking

Students who struggled with these challenges were often those who benefited most from mentor reassurance and goal-setting guidance.

### Faculty Experiences With Student Mentorship

Faculty mentors described their experiences as deeply rewarding and emphasized flexible, student-centered approaches grounded in empathy, real-world guidance, and professional development. The most frequently cited mentoring themes are presented in Figure 3.

**Figure 3**  
*Top 10 Combined Themes (Weighted and Consolidated)*



Faculty emphasized time management coaching, organization strategies, and helping students develop sustainable academic habits. One mentor explained, “Emphasizing time management and providing tools like planning templates also empowers them to stay organized and succeed academically.” Mentors also guided students through reflective processes, helping them monitor progress and set achievable goals: “I help students reflect on their progress, identify areas for improvement, and set realistic, achievable milestones.”

A key mentoring strategy was fostering independent thinking. Rather than giving answers directly, mentors encouraged inquiry-based learning: “Force feeding them information rarely is effective [...] I want them to poll me for questions I helped spark in their mind, as then it will be their own thought.”

In addition to academic support, mentors invested heavily in students’ professional development. They conducted mock interviews, provided communication and networking coaching, and guided students in understanding real expectations in the tech sector. One mentor

noted, “As a programmer, if you don’t have anything built, I’m going to question why... You have to demonstrate you really want it.” This approach helped students develop both technical and soft skills essential for entering the workforce.

Faculty also incorporated technology and real-world applications into their mentoring. Mentors used LinkedIn, virtual meetings, and free online training resources, stating, “Yes, I have recommended multiple online free resources [...] to provide statistical data on requirements for career paths.” Another mentor discussed using industry case studies and “what-if” scenarios to help mentees understand the landscape of computing careers.

Importantly, mentors described mentorship as personally meaningful. One mentor shared, “I believe it is me paying back for the mentors who have allowed me to succeed in my career.” Mentors also expressed joy in witnessing student success: “Watching the mentees graduate, get jobs, and come back to my classes to talk with the next generation [...]” These reflections show how the mentoring relationship is reciprocal, contributing to faculty members’ growth in empathy, motivation, and teaching practices.

Mentors also acknowledged areas for improvement. They expressed a desire for more structured mentoring frameworks, enhanced training, and better access to tools such as headhunting data and industry networks. One mentor remarked, “One benefit is to have a mentorship class for the mentors. Not everyone is skilled in the skillset.” and another emphasized that “creating a more structured framework for mentoring activities and increasing collaboration between mentors and faculty could enhance the overall effectiveness of the program.”

## Discussion

The perspectives shared by students and faculty point to a mentoring structure that feels practical, supportive, and closely connected to students’ day-to-day academic experiences. Students often described their mentors as approachable and helpful, noting that the guidance they received made it easier to manage coursework, clarify goals, and make decisions about their next steps. Faculty, for their part, reinforced this view, describing mentorship as an engaged and adaptive process that incorporates regular communication, individualized support, and pragmatic advice regarding academic progress and career pathways. Taken together, these perspectives demonstrate that mentoring in REP is more than a supplemental service; it is a core component of how students are supported during their final year in the program.

Across surveys and focus group discussions, both groups highlighted the importance of communication, trust, and individualized support. Students appreciated mentors who could help them sort through academic, personal, or financial challenges, and faculty emphasized the importance of understanding the circumstances students bring with them. Faculty mentors also discussed drawing from their own professional experiences, helping students make sense of what to expect in tech-related fields and how to build the skills needed to enter the workforce. These interactions contribute not only to academic growth but also to students’ confidence and readiness for life after graduation.

Overall, the findings suggest to mentorship as a key factor in strengthening students’ sense of belonging and persistence in STEM. By responding to the specific challenges students face and by offering steady academic and career guidance, faculty mentors help create an environment

where REP scholars can succeed. Table 5 summarizes these perspectives and highlights how students and faculty view the mentoring relationship in mutually reinforcing ways.

**Table 5**  
*Combined Perspectives*

Category	Student Perspective	Faculty Perspective	Combined Insight
Academic confidence	Students felt highly confident	Mentors built confidence intentionally	Reinforces students' self-efficacy
Career readiness	Students prepared for tech careers	Mentors guided career exploration	Mentorship bridges classroom & workforce
Belonging	Strong belonging in major	Mentors normalized challenges	Academic identity strengthened by mentorship
Barriers	Students face time & financial constraints	Mentors tailor support to context	Mentorship mitigates systemic inequities

Quantitative analyses further indicate that REP participation is associated with positive academic outcomes. Particularly, students in the program demonstrated an 11.27 percentage-point increase in course pass rates overall, and REP scholars showed modest GPA improvements in Spring 2025. Additionally, student perceptions of the program remained consistently positive across semesters and demographic groups. As such, these outcomes suggest that sustained faculty engagement provides a stabilizing and supportive influence that enhances both academic performance and students' overall program experience.

### Conclusion

Faculty mentorship plays a transformative role in supporting underserved senior STEM students at a major HSI. The REP program's mentorship model strengthens students' academic confidence, sense of belonging, and career readiness, while helping them navigate complex personal and structural barriers. Faculty mentors emphasized that understanding students' lived experiences, building trust, and offering concrete career preparation were essential to effective mentoring.

Quantitative results demonstrate meaningful improvements in academic performance, particularly in course pass rates, further validating the program's impact. Qualitative findings enrich this understanding by revealing the depth of mentor-mentee relationships and the significant personal growth experienced by both students and faculty.

To maximize the impact of mentorship in future iterations of REP or similar STEM education initiatives, recommendations included structured mentor training, expanded access to industry partners, enhanced soft-skill development opportunities, and improved communication of campus resources.

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