(WIP) Rebooting Success: Building the Tech-Driven Workforce of Today

Dr. Elodie Billionniere, Miami Dade College

Dr. Billionniere is a Professor in the School of Engineering and Technology at Miami Dade College (MDC). Over the past four years, she has helped secure more than $4 million in funding, which has been instrumental in developing innovative educational programs and a high-tech learning hub aimed at empowering underrepresented communities and addressing evolving workforce demands.

Her teaching, leadership, and mentorship have garnered significant recognition, including the 2021-2023 Northern Trust Bank of Florida Endowed Teaching Chair, the 2023 American Association of Community Colleges' Dale P. Parnell Distinguished Faculty Recognition Award, and the 2019 Women of Color in STEM College-Level Promotion of Education Award.

Prof. Lawrence Eric Meyer Jr, Miami Dade College

Mr. Lawrence Eric Meyer is an Associate Professor Senior in thte School of Engineering and Technology at Miami Dade College (MDC). He has been working as the Co-PI on the Dade Enterprise Cloud Computing Initiative (DECCI) cloud grant providing cloud educa

(WIP) Rebooting Success: Building the Tech-Driven Workforce of Today

Abstract

Miami Dade College (MDC) is the largest and most diverse public college in the United States and the largest hispanic-serving institution, conferring more associate degrees to Hispanic students than any other college. Nationwide MDC has the highest enrollment of Hispanic undergraduates (81,398) and ranks third for Black non-Hispanic undergraduate enrollment, reflecting the rich racial and ethnic diversity of South Florida.

The Rebooting through Emerging technology Programs (REP) at MDC aims to address the critical national demand for skilled scientists, engineers, and technicians in an economy increasingly driven by technology and innovation. The program supports students, starting as sophomores, pursuing Bachelor of Science degrees in the targeted emerging technology (EmTech) fields, focusing on increase retention and completion rates and increasing workforce placement for REP Scholars. The program completed its second year at the end of the Summer 2024 term.

The program's quantitative goals for its four-year duration include enrolling 60 REP Scholars, attaining a graduation rate of at least 80% (48 students) in baccalaureate programs, and ensuring that at least 50% (24 students) of retained scholars secure employment in the technology industry upon graduation. The targeted EmTech programs at MDC include cybersecurity, data analytics, and information systems technology (IST).

To achieve these objectives, the REP initiative adopts a cohort-based approach designed to foster a supportive academic and professional environment. Key program interventions include mentorship by faculty members with industry expertise, financial literacy education, workshops focused on workforce and graduate school readiness, opportunities for summer undergraduate research and internship, and supplemental industry certifications in AI and Cloud technologies. Furthermore, the program provides financial and personal support to scholars, enabling them to reduce their external work commitment and prioritize their academic pursuits. Despite this support, students continue to face challenges in balancing program demands with personal and professional responsibilities due to ongoing financial and economic challenges.

Program impact was assessed through surveys administered to the initial 2023 cohort of 48 students and the growing 2024 cohort of 61 students. Findings indicate significant success, with over 80% of students reporting high confidence in engaging in class discussions and collaborating with peers. Additionally, 64% expressed satisfaction with mentorship, citing it played an important role in fostering their sense of belonging. Nearly 90% of scholars felt supported by faculty and peers. However, challenges remain, as some students reported difficulties in forming meaningful friendships and expressed a need for improved mentorship quality.

Introduction

Demand for employees in advancing computational fields continues to increase [1]. However, recent turbulence in the technology job market, including significant workforce reductions, has created new challenges. Throughout 2024, 384 tech companies laid off 124,000 employees, adding to the loss of 428,449 tech workers in 2022 and 2023. While large in numbers, given the size of these companies this is only a small percentage of their overall headcount [2].

Despite these reductions, many organizations are refocusing efforts on implementing and scaling artificial intelligence (AI) projects. Even with the adoption of AI and associated workforce changes, employment opportunities in computer and information technology occupations are projected to grow faster than the average for all occupations between 2023 and 2033 [3]. This growth aligns with broader trends in technology and EmTech development. For example, global job loss by 2030 is estimated to be 92 million (8% of total employment), but new job creation is projected to reach 140 million (22% of total employment), resulting in a net growth of 78 million jobs [4]. The fastest-growing jobs are shown below in Figure 1, with the top 11 of the 15 being in technology.

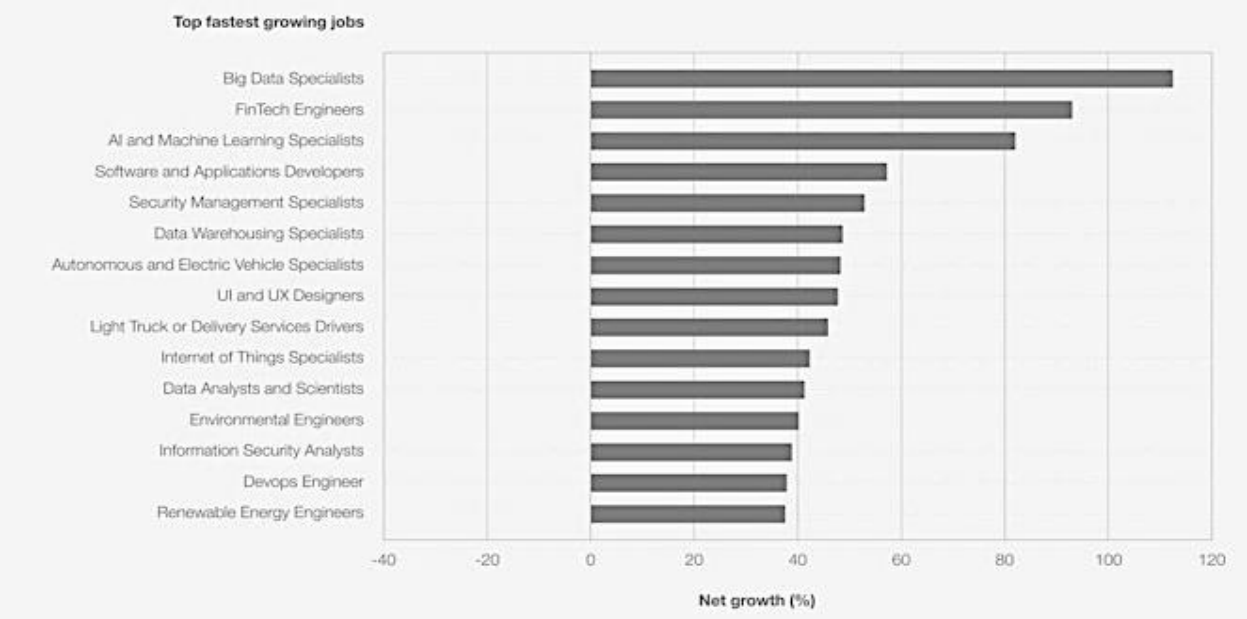

Figure 1. Global job growth [4].

Locally, employment opportunities in EmTech occupations are projected to grow by 7.3% over the next decade, surpassing the national average rate of 4.8% [5]. However, Hispanic and Black individuals remain underrepresented in these fields, reflecting a broader lack of racial and ethnic diversity in technology-related professions. Hispanic professionals comprise only 8.4% of the total workforce in computing occupations, while Black professionals represent just 8.2% [6]. These disparities highlight the need for intentional efforts to increase the participation of these groups in EmTech fields, as diversity is shown to drive innovation and improve business performance. Research indicates that companies in the top quartile for racial and ethnic diversity are 35% more likely to achieve above-average financial returns compared to their less diverse counterparts [7].

In addition to fostering innovation, expanding access to lucrative technology fields can help address socioeconomic inequities that disproportionately impact Hispanic and Black communities. To achieve this, it is crucial to implement strategies that leverage diverse talent pools through training, recruitment, and support initiatives. Given approximately one-third to one-half of employees are expected to seek new occupations requiring reskilling or upskilling by 2030 [8] the current period of technological transformation offers a unique opportunity to engage underrepresented groups.

Some niches within the STEM fields, like EmTech (cloud computing, data science, artificial intelligence/machine learning, cybersecurity), present particularly promising opportunities for Hispanic and Black professionals [9], [10]. Programs like The College's REP initiative are designed to address these disparities by providing access to advanced training, mentorship, and career development resources. By equipping Hispanic and Black students with the skills needed to succeed in EmTech fields, REP helps build a more inclusive and representative workforce while addressing critical gaps in the technology sector.

The three EmTech bachelor's degrees—Data Analytics, Cybersecurity, and IST—supported by MDC are part of fields showing significant employment growth. The Bachelor of Science in IST program is a foundational pathway for IT positions and is projected to grow by 15% over the next decade [3]. Graduates of this program support the design and integration of projects in various industries, including financial and enterprise-level systems. Notably, AI integrations and expansions in major industries, particularly financial institutions, are driving job growth in these fields [11]. Cybersecurity continues to experience strong demand, with year-on-year growth of 11.3% in North America in 2023. Globally, the cybersecurity labor gap increased by 12.6% from 2022, resulting in a shortfall of 4 million workers (Smith, G., 2024, December 10). Industry hiring preferences lean toward candidates with certifications and experience, which are emphasized in the Bachelor of Science in Cybersecurity program [12]. Data Analytics represents the largest growth opportunity globally, with a 115% increase in job opportunities anticipated [4]. This field, which involves using analytical tools and techniques to extract meaningful insights from data, is projected to grow by 36% from 2023 to 2033 [3].

The goal of the REP program at the College is to address the national demand for these skilled scientists, engineers, and technicians by selecting and supporting students pursuing these degrees, improving retention and completion rates, and increasing workforce placement of REP Scholars. The program completed its second year at the end of the Summer 2024 term.

Background

Over 50 years, MDC had admitted more than 2 million students, reflecting the area's demographics consists of the nation's most diverse student body. Currently, 68% of MDC students are low-income, 47% live below the federal poverty level, and 58% are first-generation college students [13]. This diverse student body represents a significant untapped population for addressing workforce needs in STEM and EmTech workforce fields. As seen in Figure 2, 77% of college credit students are Hispanic, 18% are Black non-Hispanic. MDC's academic programs offer a range of degree pathways to prepare students through REP for entry into the modern workforce or for the pursuit of higher education.

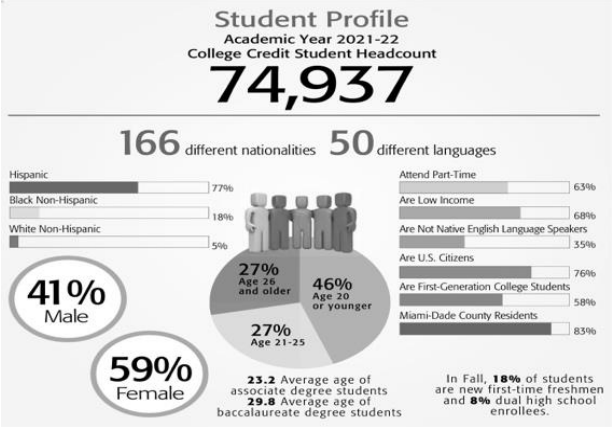

Figure 2 Demographics of MDC College Credit Students [13].

The School of Engineering and Technology offers three Bachelor of Science programs that REP focuses on: Cybersecurity, Data Analytics, and IST. These programs are available to graduates with an associate degree (either AA or AS) in any field who wish to pursue a bachelor's degree.

MDC's Bachelor of Science in Information Systems Technology provides students with the critical skills and essential knowledge necessary to direct and control computerized information resources within diverse organizational settings. Students may specialize in either Software Engineering or Networking. Graduates are trained to define and analyze information system requirements, implement, and administer effective solutions, apply project management methodologies, and ensure the confidentiality, integrity, and availability of organizational information. This program also offers pathways to advanced education, including agreements with four universities that allows graduates to complete a master's degree in as little as one year.

The ongoing shift of corporate computational resources from 100% on premise to remote or hybrid cloud systems —accelerated by the COVID-19 pandemic—has heightened demand for IT cloud professionals. In response, MDC developed a state-of-the-art Cloud Computing Center, which serves as a hub for collaboration among technology leaders, industry experts, and students. The Center provides students and IT professionals with exposure to leading cloud platforms and the certifications necessary to meet growing workforce demands, including AWS Cloud Practitioner, Solutions Architect Associate, and Developer certifications. These certifications are part of the 24-credit Enterprise Cloud Computing Certificate program and the associate in science degree in Enterprise Cloud Computing, which together equip students with a comprehensive foundation in cloud technology. Since academic year 2018-19, the cloud program has produced 363 graduates, 12% of whom are women. These graduates have successfully secured employment with prominent industry partners such as Florida Power & Light, Amazon Web Services, Disney, Belle Fleur Technologies, and more [14].

Data Analytics is an emerging, in-demand technology related to the explosion of "big data" professional opportunities. MDC created its Data Analytics program in response to the significant growth (36%) in job opportunities forecast over the next decade [3]. Over the past few years, it has revolutionized the way organizations function across all modern industries. This shift has created a talent gap for data analysts with the appropriate training and skill set. MDC's Bachelor of Science in Data Analytics is one of Florida's first undergraduate degrees addressing

this growing demand. Graduates are prepared to identify, analyze, interpret, and present the volumes of data critical to organizational success. Since academic year 2017-18, 87 graduates, 29.8% of whom are women, secured employment with prominent industry partners such as Assurant, Carnival Cruise Lines, Jackson Health System, UPS, American Express, Baptist Health South Florida, and more.

Cybersecurity is an increasingly critical field as companies seek specialists to protect their digital assets from evolving threats. MDC's Bachelor of Science in Cybersecurity equips students with cutting-edge knowledge, hands-on skills, along with industry certifications. The program is built on the National Initiative for Cybersecurity Education (NICE) framework and the Center of Academic Excellence in Cyber Defense Education (NCAE-C) knowledge units, as defined by the National Security Agency and Department of Homeland Security. Students gain practical experience through MDC's Cybersecurity Center of the Americas, a practical Cyber Range, where they simulate and respond to real-world cyberattacks. Launched in Spring 2021, the program offers future graduates the opportunities to join the workforce with industry partners such as CLEER, Lumu Technologies, Blackstone, Kaseya, and BankUnited.

By leveraging these three bachelor's programs, REP aims to diversify and broaden the participation of underrepresented Hispanic and Black students in EmTech fields. Through this initiative, MDC strives to increase the retention, graduation, and workforce placement of these students in high-demand EmTech industries, ultimately addressing critical diversity and workforce gaps.

Key Program Activities

REP scholars are students who have completed an associate degree with a minimum GPA of 3.0 and meet the admission requirements for one of the three bachelor's programs in computing. These scholars enroll full-time at MDC with the objective of earning their bachelor's degree within two years. The program prioritizes evidence-based support strategies that have been shown to enhance success among STEM and computing students. Through these targeted interventions outlined in Figure 3, the REP program prepares scholars with the knowledge, skills, and resources necessary to excel academically and transition seamlessly into careers in EmTech fields.

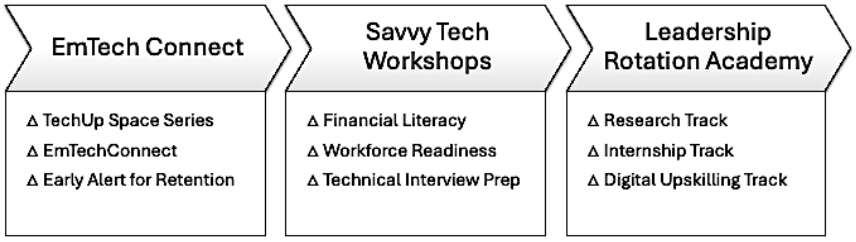

Figure 3. REP Scholars Program Activities.

TechUp Space Series: REP collaborated with industry professionals from underrepresented groups to discuss about the role of AI, including ethical and responsible use, as well as cloud computing in the workplace, focusing on applications, practical tips, and implications. Additionally, the #IamRemarkable workshops empowered participants with self-promotion skills and career-building strategies [15]. One workshop is offered each major term.

EmTechConnect: MDC faculty with industry experience serve as mentors to REP scholars, providing guidance on academics, career planning, and personal development [16], [17]. Each program concentration is paired with a dedicated adjunct faculty mentor with relevant industry expertise. Scholars meet with their mentor at least once per major term, with mentors submitting progress reports to track development and address challenges.

Early Course Intervention for Retention: REP leadership monitors scholars' participation, engagement, grades, and mentor reports. Those scholars enrolled in high-risk or repeated courses submit bi-weekly progress reports outlining progress, challenges, and resource use [18]. Support includes scheduling study sessions, tutoring, or professor meetings to ensure academic success.

Financial Literacy: The Center for Economic Education at MDC provided financial literacy workshops during each major academic term over two years. These sessions aimed to prepare scholars to be responsible consumers, entrepreneurs, and investors while promoting economic participation and financial independence [19]. One workshop is offered per major term.

Workforce Readiness: The MDC Works Next Generation Career Studio provides REP Scholars with soft-skills training, resume-building, LinkedIn resources, and job search assistance, offering two workforce workshops per term. A partnership with CodePath adds technical interview preparation through two spring workshops: one for practice and one for live simulations. These activities aim to address workforce preparedness gaps for minority and low-income groups, as highlighted by an international survey emphasizing the need to reduce inequality [20].

Leadership Rotation Academy: The program offers three summer tracks—Research, Internship, and Digital Upskilling—focused on EmTech and workforce readiness. Scholars rotate through all tracks during their program, earning college credits and prioritizing goals unmet in previous tracks. The Research Track develops analytical skills through academic or industry projects, the Internship Track provides hands-on experience and networking, and the Digital Upskilling Track enhances technical proficiency, leading to industry certifications. These tracks aim to enhance scholars' ability to showcase their skills during the hiring process, expand their knowledge of application strategies, and improve their academic success and retention [21], [22], [23], [24].

It is worth noting that all activities are conducted and recorded via Zoom to accommodate REP scholars across MDC's eight campuses. Students unable to attend the live sessions can access the recordings, complete the post-assessment, and submit feedback on the session, which will count toward their active engagement.

Research Methodology

Year 1 of the NSF-funded initiative focused on planning and establishing critical evaluation milestones. In Year 2, the Evaluation Team gathered data through a semester-wide survey and feedback surveys administered following six workshop events. Responses from the workshop surveys were analyzed to assess the effectiveness of these program activities. The surveys, administered at the end of Fall 2023 and Spring 2024, gathered REP scholars’ feedback on the level of support they received from faculty and peers, as well as their sense of belonging within their cohort.

Comparative quantitative analysis was used to find changes between the two semesters. Paired data was collected from the same group of students at two different times, resulting in two sets of data points for each student. As the pre- and post-surveys could be matched, a paired samples t-test was used to determine whether there was a significant difference in students' self-ratings between the fall and spring. The t-test begins by formulating the null hypothesis (H_0), meaning that there is no difference in means between the pre-survey and post-survey ratings, and the alternative hypothesis (H_1), meaning that there is a significant difference. The difference between each pair of observations is calculated, and the mean (D) and standard deviation (sD) of these differences are determined. The test statistic t is then calculated using the formula:

$$t = \frac{D}{sD\sqrt{N}} \quad (1)$$

where:

N = the number of paired observations.

The degree of freedom for the test is $N-1$ [25]. The p-value, which indicates the probability of observing the data if the null hypothesis is true, is obtained by comparing the calculated *t-statistic* to the *t*-distribution with $N-1$ degrees of freedom. If the *p-value* is less than the chosen significance level (in this case, 0.05), the null hypothesis is rejected, indicating a statistically significant difference between the pre-survey and post-survey ratings. In SPSS, this process involves entering the pre-survey and post-survey ratings into two columns, running the paired-samples t-test, and interpreting the output, which includes the mean difference, standard deviation, standard error, t-value, degrees of freedom, and p-value. This detailed process was utilized and allowed for a rigorous evaluation of whether the program activities between the pre-survey and post-survey led to a significant change in students' ratings.

Students' institutional data was also shared with the Evaluation Team to provide key variables, such as GPA, in-state residency status, Pell Grant eligibility, and semester-to-semester persistence. Institutional data was provided for REP Scholars and non-scholars participating in the EmTech degree pathways. The team performed logistic regression to determine how REP affected the students' likelihood of persevering, a binary outcome. Thus, it was a superior tool compared to the linear counterpart alone. The dependent variable, semester-to-semester retention, was coded in the binary format of 0 and 1, transforming the linear predictor into a probability via the logistic curve—an S-shaped function [26].

Key Outcomes

The following summarizes data collected by the survey responses from the REP Scholars during the fall (48) and spring (61) semesters of the 2023-2024 school year. All matriculated REP scholars took the survey, meaning the survey had a 100% response rate.

As shown in Tables 1 and 2, 48 REP Scholars provided demographic details in the initial program survey conducted in the fall. At that time, 75% of the scholars identified as men, with the most common race/ethnicity being Hispanic/Latino(a/x) at 50%, followed by Black/African American at 21%. By the spring semester, 61 scholars completed the survey, with 41%

identifying as Hispanic/Latino(a/x) and 23% as Black/African American. Additionally, 70% of respondents identified as men, while 28% identified as women.

Table 1. Race/Ethnicity of REP Scholars.

	Fall 2023 (N=48)	Spring 2024 (N=61)
Hispanic/Latino(a/x)	50% (24)	41% (25)
Black/African American	21% (10)	23% (14)
Asian/Asian American/ Pacific Islander	2% (1)	2% (1)
White/Caucasian	0% (0)	2% (1)
Two or more races	23% (11)	30% (18)
Prefer not to respond	4% (2)	3% (2)

Table 2. Gender of REP Scholars.

	Fall 2023 (N=48)	Spring 2024 (N=61)
Man	75% (36)	70% (43)
Woman	23% (11)	28% (17)
Non-binary	2% (1)	2% (1)

The data revealed mixed results for employment and professional development among scholars. In the fall 42% (20) worked full-time, in spring 49% (30) worked full-time. The part-time scholars' percentage decreased from 29% (14) in the fall to 18% (11) in the spring. The spring survey contained an additional question, asking scholars to report if they changed their work hours due to the scholarship. Notably, given the goal of scholarships to help scholars maintain a work study balance, 15% (9) of scholars indicated in the spring survey that they had reduced their work hours due to the scholarship funding. The percentage of scholars holding certifications significantly increased from 27% (13) in the fall to 57% (35) in the spring, a substantial improvement in professional qualifications among the participants. These results are displayed below in Table 3.

Table 3. Employment Characteristics of REP Scholars Fall to Spring.

	Fall 2023 (N=48)	Spring 2024 (N=61)
Employed FULL-TIME	42% (20)	49% (30)
Employed PART-TIME	29% (14)	18% (11)
NOT employed	29% (14)	33% (20)
REDUCED work hours	-	15% (9)
Employed in tech role	38% (18)	34% (21)
Has CERTIFICATION(S)	27% (13)	57% (35)

Table 4 illustrates how the responses evolved between the fall and spring surveys, based on participants who were present during both collection periods.

Table 4. Employment Status of REP Scholars Fall to Spring, Matching Pairs Only.

	Fall 2023 (N=46)	Spring 2024 (N=46)
Employed FULL-TIME	41% (19)	48% (22)
Employed PART-TIME	30% (14)	21% (10)
NOT employed	28% (13)	30% (14)

The REP Scholars reported the scholarship is critical to completing their degree, with 13% (8) rating it as *very important* and 87% (53) rating it as *extremely* important. These proportions are all nearly identical to those reported in the fall.

The participants in both semester surveys expressed high confidence with over 80% rated themselves as very confident or highly confident in speaking up in class, collaborating across diverse backgrounds, and adapting changes in plans. Skills such as assisting others in learning and managing time wisely received lower confidence ratings from some students. The scholars held positive perceptions of the support they were receiving as a REP scholar with only a minority expressing uncertainty about where to seek advice and reported difficulties in forming friendships with peers. The fall survey explored students' sense of belonging within their degree programs, revealing widespread acceptance and encouragement and only a few respondents expressed neutrality or disagreement.

The spring semester survey asked the REP Scholars to rate their agreement with several statements about their identification with EmTech-related skills. Most students strongly agreed they possessed the skills and/or intentions. Figure 4 shows how strongly the students identified with the statements.

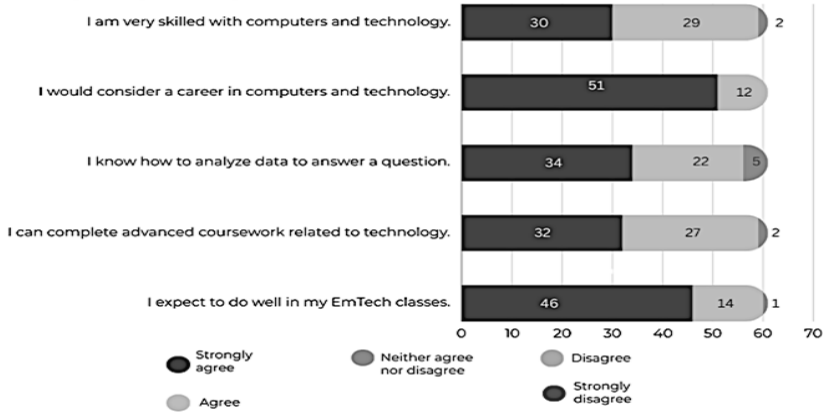

Figure 4. Spring 2024 REP Scholar's Self-Assessment of EmTech-Related Skills (N=61).

The spring survey also asked the students to rate their agreement with several statements about self-efficacy in their EmTech classes and technology overall. As shown in Figure 5, most respondents reported a strong desire to enter the workforce in a technology-related field after. Over 85% of scholars agreed or strongly agreed with all the positive statements, an increase from the fall's 80% results.

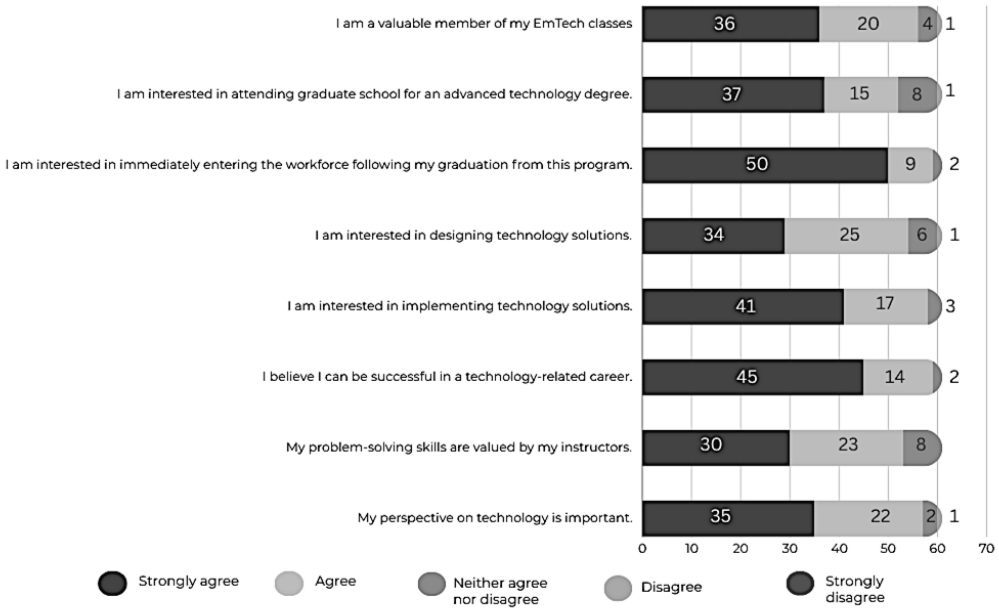

Figure 5. Spring 2024 REP Scholar's Self-Efficacy in Technology/EmTech (N=61)

According to Figure 6, the scholars reported their confidence in several skills related to supporting others and reaching goals. Most (over 77%) rated themselves as *very confident* or *extremely confident* in all skills, including making their voices heard in class, working with others from different backgrounds, and adapting when plans change. In the fall, a few students rated themselves as *not at all confident* in some of the skills, in the spring semester, no REP Scholars rated themselves as *not at all confident* in any skill.

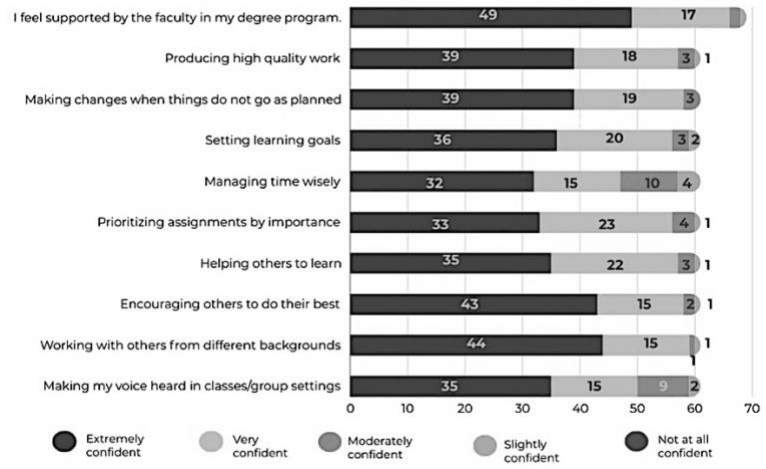

Figure 6. Spring 2024 REP Scholar's Confidence in Their Skills (N=61).

When asked about the quality of support offered, scholars had a high perception of the support network provided to them thus far with nearly 90% of scholars agreed or strongly agreed with the positive statements. A few students disagreed with they knew who to go to for advice when they had problems with classes (3%, 2), and some stated they had not developed friendships with other students (7%, 4).

The surveys asked REP Scholars to rate their satisfaction with the mentoring they received and their overall satisfaction with the program. In the fall semester, most students (69%, 33) reported being very satisfied with the program overall. In the spring semester overall, 80% (49) of respondents rated the program as very satisfied. When rating the mentoring for the spring, 97% (59) responded that they were very satisfied or satisfied with the mentoring. A *t-test* determined no statistically significant difference in students' satisfaction with the mentoring or the program overall from the fall to the spring. Figure 7 shows the distribution of responses by degree program to the satisfaction ratings.

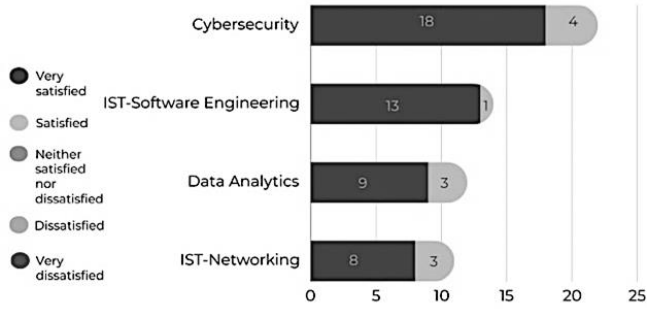

Figure 7. Spring 2024 REP Scholar's Overall Satisfaction with the REP Program by Degree Program (N=61).

Responses were examined for differences in men and women's ratings of the program. A *t*-test found no statistically significant difference: in men's average satisfaction rating with the mentoring and the program compared to the women's ratings, in how self-rating changes from the fall to the spring, in the average satisfaction ratings between mentoring in the three degree programs and no statistically significant difference in how self-rating changes from the fall to the spring.

Building on this analysis, the Evaluation Team conducted a comparative study in July 2024 to assess differences between REP Scholars and non-REP EmTech students, focusing on fall-to-spring retention rates and current GPA. While GPAs showed no significant differences, REP Scholars had a higher retention rate (96.67%) than non-REP students (87.70%) from fall 2023 to spring 2024.

Conclusion and Future Work

The REP program will continue to provide workshops, mentoring, and assessments, including scholar surveys, to support student success. Survey findings highlight the critical importance of scholarship support, with 13% of scholars rating it as very important and 87% as extremely important in helping them achieve their degrees and reduce their workloads (15% of scholars reported a workload reduction). Certification achievement among scholars showed a 30% increase, which aligns with a potential rise in tech job opportunities. Overall, survey results indicate that the REP program offers high-quality instructors and mentors, with minor exceptions.

To enhance the program's impact, scholarships and certifications will remain a priority, as they play a crucial role in driving scholar success toward graduation. Additionally, the program will

place greater emphasis on balancing the timing of workshops and events to facilitate more in-person interactions, especially for virtual students, to strengthen their sense of community. Expanding opportunities for in-person engagement will foster a stronger connection among scholars, peers, and faculty mentors, contributing to a more cohesive and supportive cohort. Efforts will also focus on enhancing the quality and consistency of mentorship across all programs. To address variability, some mentors may require additional training through a more thorough and structured mentorship development program. This improvement is essential to ensure that scholars receive high-quality, uniform guidance across all concentrations.

As of December 2024, the program supports 68 scholars across four Bachelor of Science (BS) degree concentrations, as shown below in Table 5.

Table 5. Scholar Graduation Progression Across Semesters in REP Program.

BS degree	Scholars	Spring 2024	Summer 2024	Fall 2024	Spring 2025	Summer 2025	Fall 2025
Cybersecurity	31	5	2	9	4	6	5
Data Analytics	11	4	2	-	5	-	-
IST - Software Engineering	14	-	1	-	9	-	4
IST - Networking	12	-	5	1	4	1	1
Total	**68**	9	10	10	23	7	10

The REP program celebrated the early graduation of 29 scholars. Of these graduates, 27 (93.10%) completed either the Post-REP Education and Employment Survey or the Fall 2024 end-of-semester survey. Among respondents, 21 (78%) reported being employed, and 19 of those (90.48%) secured positions within the computing field or an adjacent field. Furthermore, eight graduates (32%) have opted to further their education in graduate school. In terms of earnings, eight of the 19 employed graduates (42.11%) reported annual salaries of $72,800 or higher, demonstrating the program's effectiveness in preparing scholars for lucrative careers in the EmTech industry.

The REP program has shown significant success in supporting scholars through scholarships, certifications, mentoring, and community-building activities. Moving forward, the program will prioritize further improving mentorship consistency, enhancing community engagement, and adapting workshops and events to better meet the scheduling needs of scholars. These efforts will continue to support the development of a diverse, well-prepared workforce for the EmTech industry.

Acknowledgment

This material is based upon work supported by the National Science Foundation Scholarships in Science, Technology, Engineering, and Mathematics (S-STEM) program under Award No. 2220260. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

References

[1] National Academies of Sciences, Engineering, and Medicine. *Information Technology and the US Workforce: Where Are We and Where Do We Go From Here?*, National Academies Press, 2017.

[2] E. Sayegh. *The Great Tech Reset: Unpacking The Layoff Surge Of 2024*, 2024, [Online]. Available: https://www.forbes.com/sites/emilsayegh/2024/08/19/the-great-tech-reset-unpacking-the-layoff-surge-of-2024/

[3] U.S. Bureau of Labor Statistics. *Occupational Outlook Handbook, Data Scientists*, 2024, [Online]. Available: https://www.bls.gov/ooh/math/data-scientists.htm

[4] Future of Jobs Report 2025 Insight Report. World Economic Forum, 2025, [Online]. Available: https://www.weforum.org/publications/the-future-of-jobs-report-2025/

[5] Economic Modeling Specialists International. *Occupation Overview: 11 Computer and Information Systems Occupations in Miami-Dade County, FL*, Economic Modeling, 2022.

[6] U.S. Bureau of Labor Statistics. (2020). *Employed Persons by Detailed Occupation, Sex, Race, and Hispanic or Latino Ethnicity: Labor Force Statistics from the Current Population Survey*, 2020, [Online]. Available: https://www.bls.gov/cps/cpsaat11.htm

[7] I. Bouchrika. *Why Is There Still a Lack of Diversity in Tech in 2025?*, 2024, [Online]. Available: https://research.com/education/why-is-there-still-a-lack-of-diversity-in-tech

[8] J. Manyika, S. Lund, M. Chui, J. Bughin, J. Woetzel, P. Batra, R. Ko, and S. Sanghv. *Jobs lost, jobs gained: What the future of work will mean for jobs, skills, and wages*, 2017, [Online]: Available: https://www.mckinsey.com/featured-insights/future-of-work/jobs-lost-jobs-gained-what-the-future-of-work-will-mean-for-jobs-skills-and-wages

[9] R. Rawlings-Goss. *Data Science Careers, Training, and Hiring*, Springer International Publishing, 2019.

[10] N. Soni, E. K. Sharma, N. Singh, and A. Kapoor. *Artificial Intelligence in Business: From Research and Innovation to Market Deployment*. Procedia Computer Science, 2020, vol. 167, pp. 2200-2210, [Online]. Available: https://doi.org/10.1016/j.procs.2020.03.272

[11] T. Mickle. *Tech Layoffs Reflect Shift To A.I. Focus*. New York Times, 2024, [Online]. Available: https://link.gale.com/apps/doc/A781513571/AONE?u=lincclin_mdcc&sid=googleScholar&xid=071c8406

[12] G. Smith. *50+ Cyber Security Job Statistics & Trends for 2025*, 2024, [Online]. Available: https://www.stationx.net/cyber-security-job-statistics/

[13] Miami Dade College Scorecard 2022-2023. [Online]. Available: https://www.mdc.edu/media/mdc/institutional-research/documents/MDC_Scorecard.pdf

[14] E. Billionniere and L. Meyer. *Transforming Education: Upskilling for a Cloudy Tomorrow*, SIGITE '21: Proceedings of the 22nd Annual Conference on Information Technology Education, 2021, pp. 91-96, [Online]. Available: https://doi.org/10.1145/3450329.3476863

[15] #IamRemarkable. https://www.rmrkblty.org/iamremarkable

[16] M. Ashtiani and C. Feliciano. *Access and mobilization: How social capital relates to low-income youth's postsecondary educational (PSE) attainment*, Youth & Society, 2018, vol. 50, no. 4, pp. 439-461.

[17] M. Karp, S. Ackerson, and I. Cheng. *Effective Advising for Postsecondary Students: A Practice Guide for Educators*, WWC 2022003 What Works Clearinghouse, 2021.

[18] G. Achenbach, L., J. Barker, and L. D. Thompson. *A Systemic Approach to Recruiting and Retaining Women in Undergraduate Computing*, 2018 CONECD - the Collaborative Network for Engineering and Computing Diversity Conference, 2018, [Online]. Available: https://www.asee.org/public/conferences/113/papers/24198/view
[19] A. C. Lyons. *Credit practices and financial education needs of Midwest college students*, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, 2007, Champaign, IL.
[20] P. A. Cummins, T. Yamashita, R. J. Millar, and S. Sahoo. *Problem-solving skills of the US workforce and preparedness for job automation*, Adult Learning, 2019, vol. 30 no. 3, pp. 111-120.
[21] B. A. Nagda, S. R. Gregerman, J. Jonides, W. von Hippel, and J. Lerner. *Undergraduate student faculty research partnerships affect student retention*, Review of Higher Education, 1998, vol. 22, no. 1, pp. 55–72.
[22] C. J. Ward, K. Ohde, J. S. Rose, C. Critchlow, J. Park, and A. L. Vaughan. *First-Year Seminars: Supporting STEM College Student Academic Success and Persistence*, Journal of The First-Year Experience & Students in Transition, 2020, Vol. 32, no. 2, pp. 45-58.
[23] P. Dyjur and G. Lindstrom. *Perceptions and Uses of Digital Badges for Professional Learning Development in Higher Education*, TechTrends, 2017, vol. 61, no. 4, pp. 386-392.
[24] R. Shields, and R. Chugh. D*igital Badges–Rewards for Learning?*, Education and Information Technologies, 2017, vol. 22, no. 4, pp. 1817-1824.
[25] A. Aron, E. Coups, and E. Aron. *Statistics for Psychology* (6th ed.), 2017, Pearson.
[26] D. W. Hosmer, S. Lemeshow, and E. X. Sturdivant. *Applied Logistic Regression* (3rd ed.), 2013, Wiley.