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# BOARD # 380: Innovative and Meaningful Mentoring to Enhance Retention, Success, and Engagement in STEM, an NSF S-STEM project

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# Innovative and Meaningful Mentoring to Enhance Retention, Success, and Engagement in STEM, an NSF S-STEM project

## 1 Introduction

The high cost of living in the San Francisco Bay Area results in significant unmet financial need for students, prompting many to seek part-time or full-time employment while pursuing their education. Innovative and Meaningful Mentoring to Enhance Retention, Success, and Engagement (IMMERSE) in STEM seeks to improve the retention and graduation of high-achieving, low-income students with demonstrated financial need at Skyline College, a two-year Hispanic Serving Institution (HSI) located in Silicon Valley, a hub of STEM innovation with many high-demand jobs, by combining financial assistance with evidence-based practices, such as multi-tiered mentoring[1 2] , ePortfolio adoption[3 4] and participation in co-curricular activities. In particular, the major goals of the project are as follows.

(1) leverage existing high-impact, evidence-based processes already implemented on campus to ensure that IMMERSE students maximize opportunities to support their success and career potential (2) implement a cohesive multi-tiered mentorship program to increase retention, student success, and graduation of IMMERSE scholars; (3) expand industry partnership in association with workforce development campus resources to support IMMERSE scholars academic and career pathways by providing industry mentoring, internship accessibility and transfer support; and (4) disseminate findings on the development of an innovative mentorship program and other evidence-based methodologies, such as the implementation of ePortfolios to support low-income STEM students, with demonstrated unmet needs and academic talent.

## 2 Methods

IMMERSE in STEM is in its third year of implementation and has supported three cohorts, for a total of 39 students so far, including seven who have transferred to a 4-year university. All students receive up to $10,000 a year, for up to three years. The scholarship amount each student receives is based on their amount of financial unmet need, and the determination of scholarship amounts and their disbursements are determined by the Financial Aid office. The logic model illustrating IMMERSE's design is depicted in Figure 1. In addition to scholarships, the project incorporates a transformative approach to mentoring, and innovative supports intended to address financial and academic barriers. All participating students engage in a comprehensive set of evidence-based co-curricular services designed to support their persistence, completion, and transfer. Faculty mentors are trained on innovative and effective approaches to student retention and success, such as the implementation of ePortfolios. The project timeline is described in Figure 2.

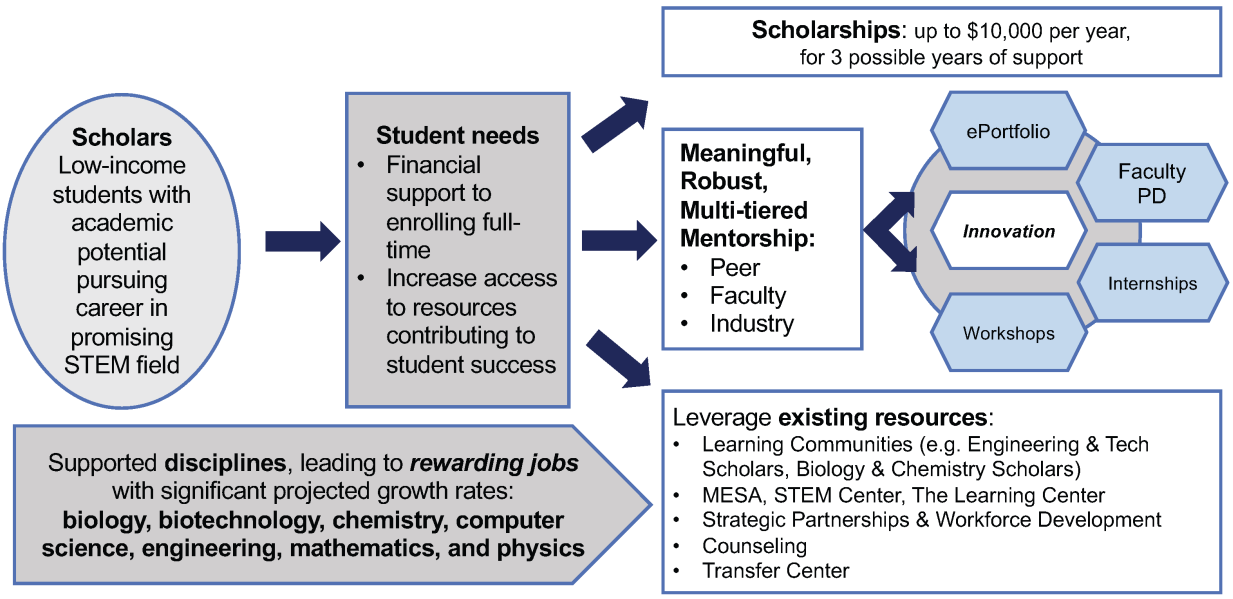


Figure 1: IMMERSE in STEM Logic Model

In practice, the successful implementation of these goals includes

- Recruitment of ten scholars per year
- Identification and training of faculty mentors, and pairing with scholars
- Dissemination of unmet need up to $10,000/year to scholars
- Creation of e-portfolios by scholars
- Completion of summer internship applications
- Participation in transfer workshops
- Peer mentoring by scholars
- Identification of industry partners and recruitment of industry mentors

The implementation of IMMERSE in STEM has been successful so far, starting with recruitment efforts. A webpage and an online application were created in the Fall of 2022, along with promotional materials. 11 scholars joined the program in January 2023, followed by 13 more in January 2024, and an additional 10 in January 2025, as shown in Table 1. As scholars left the program (e.g. for transfer), more scholars were recruited to receive support. Each scholar has been paired with a faculty mentor, who received training beforehand. A Canvas (Learning Management System used at Skyline College) shell was created to interact with scholars and mentors, and track their progress. Recruitment efforts included IMMERSE in STEM scholars in Years 2 and 3. They were instructed to speak about the program in their classes. Peer-to-peer recruitment turned out to be a very effective method of recruitment, as information about the benefits of the program quickly spread within the STEM community on campus. It was also

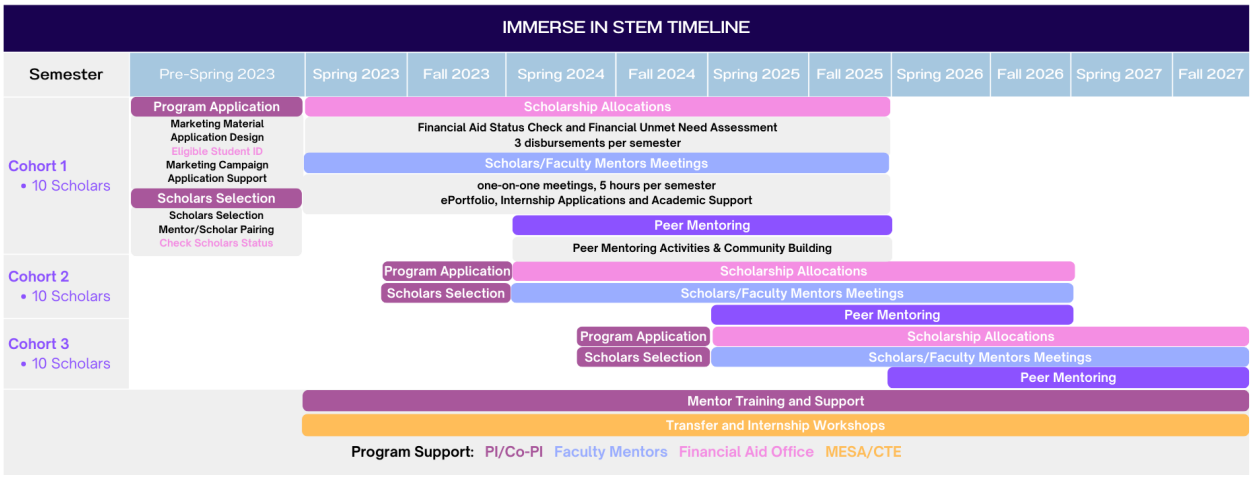


Figure 2: IMMERSE in STEM Timeline

reinforced by existing and prospective faculty mentors sharing application information in their classes.

| | Spring 2023 | Fall 2023 | Spring 2024 | Fall 2024 | Spring 2025 |
|---|---|---|---|---|---|
| Cohort I | 11 | 12[(1)] | 11[(2)] | 7[(3)] | 7 |
| Cohort II | | | 13 | 11[(4)] | 13[(5)] |
| Cohort III | | | | | 10 |
| Total | 11 | 12 | 24 | 18 | 30 |

Table 1: Cohort Sizes

[(1)] 1 scholar who had been selected to join the first cohort started in Fall 2023 due to delays in the financial aid application process. [(2)] 1 student from cohort 1 transferred to a 4-year university in Spring 2024. [(3)] An additional 3 students from cohort 1 transferred to a 4-year university in Fall 2024. They continue to receive the rest of the scholarship amount allocated to them for Year 2 of the program. 1 student was no longer eligible for the program. [(4)] 1 student from cohort 2 transferred to a 4-year university in Fall 2024 and continues to receive the rest of the scholarship amount allocated to them for Year 1 of the program. 1 student was no longer eligible for the program. [(5)] 2 students transferred to a 4-year university in Spring 2025. To fill open positions, we recruited four scholars for one-year scholarships.

While recruitment efforts continued, more opportunities to connect with industry partners and peer mentors were offered in Year 2 of the program (2024). In April 2024, IMMERSE in STEM scholars had the opportunity to go on a tour of Dexterity, a start-up that designs robotics systems for shipping and other logistics industry companies. They also had a chance to visit SLAC National Accelerator Laboratory in May 2024. These field trips were enriching experiences, with a scholar commenting in a feedback survey “The most helpful was finding more activities such as the Dexterity field trip. It was so exciting and seeing what I could do around my field.”.

In Spring 2024, peer mentoring events were organized, including a campus tour organized by scholars from the first cohort. A significant fraction of IMMERSE scholars were also able to connect with peers at the S-STEM Scholars meetings in Fall 2023 and 2024 (4 were selected in 2023, and 5 in 2024), including some who had the opportunity to present research posters. One scholar reported "I attended the S-STEM scholars meeting in Washington D.C in Fall 2023. It was very impactful seeing many others like me having a dream and getting out of their comfort zone and talk about their projects or interests. The college booths were very insightful as well due to many putting me in reality check with my major and giving me the do's and don't about about being successful in my field."

Having access to such unique opportunities, paired with faculty mentoring has greatly benefited scholars. In the words of one of them: "I like the one-on-one meetings with my mentor who provide academic and professional guidance. Not only that, but being able to discuss my thoughts and opinions on my career and topics related to my major. I am also grateful for the opportunities to be able to travel to different places such as the upcoming out-of-state conference in Chicago to meet new people and get a sense of what the STEM realm has to offer." As a result, the program has become more popular, with an increase in the number of applicants every year.

## 3 Results

A confidential IMMERSE in STEM scholars feedback survey was administered in collaboration with the Skyline College's Office of Planning, Research, Innovation and Effectiveness (PRIE) (n=8 in Year 1, n=14 in Year 2) and showed instructive feedback. In Spring 2024, 19 faculty mentors, including PI and Co-PI worked with students and developed meaningful connections with scholars: 13 full-time faculty and 6 adjunct faculty. This is a significant portion of faculty in the Skyline College STEM division, made up of 25 full-time faculty and 33 adjunct faculty. As projected, the second cohort of scholars includes a larger percentage of the STEM full-time faculty (compared to 9 full time faculty and 4 adjunct faculty in Spring 2023), with now more than half of the full-time faculty in the STEM division participating in the program. This may have a lasting impact on teaching practices and community building for faculty. According to the survey of scholars, all found that one of the most important aspects of having a faculty mentor was a connection with someone with expertise in their field of study, while 78.6% also reported that it was important for them to receive support from their mentor on how to succeed in their classes. The survey also showed that the program increases the sense of belonging of all scholars who responded. This also applies to faculty mentors. Faculty mentors have been able to bring their expertise in their mentoring and teaching in new ways. They also connected with the broader student body by learning from their mentees. They were also encouraged to build their own ePorfolios, and to use ePortfolios in their courses.

Throughout the implementation of the program, important information was gained about the needs and experiences of scholars.

- Some scholars have needed guidance to navigate the financial aid application process. In a first phase of recruitment, it is important to highlight the importance of being financial aid eligible, even when, as is the case for Skyline College, "free college" is available to students. In addition, on-campus work and internship stipends count against unmet

financial needs, which can reduce scholarship amounts in some cases.

- Scholar's needs are often complex and involve much more than money. Flexibility, persistence and understanding can be needed to ultimately create scholar success.
- Scholars' perception of the program is highly favorable, with benefits beyond expectations and progression from Year 1 to Year 2. The survey of scholars showed overwhelming positive results, including 78.6% of Year 2 (versus 62.5% in Year 1) respondents indicating the program has exceeded their expectations so far, 21.4% of Year 2 (versus 37.5% in Year 1) respondents indicating the program has met their expectations so far, and zero respondents indicating the program fell short of their expectations (same as Year 1).
- Continuing scholars can be a great resource to the program (i.e. peer mentoring, recruiting). Some of them are enthusiastic about such contributions and have come up with their own initiatives to grow a strong sense of community with the IMMERSE in STEM family.

## Discussion

Out of 39 students recruited so far in the program, seven have transferred to a 4-year university and the rest of them are in good standing, progressing towards transfer. Their personal and intellectual growth throughout their time in the program is evident not only from their success in classes, but also in their increased feelings of connection to the school and to their chosen STEM major. Through internships, industry field trips, attendance at conferences and STEM club participation, scholars begin to see themselves as professionals in STEM fields which builds confidence and prepares them to be successful when they transfer.

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