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BOARD # 375: Implementing an Industry Mentorship in an NSF S-STEM Program to Enhance Engineering Students' Transition to the Workforce

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Abstract

Industry mentorship has been shown to be effective in bridging the gap between classroom instruction and the professional engineering environment. Through such mentorship, students expand their professional networks, cultivate vital communication and collaboration skills, and gain real-world perspectives on the engineering profession. While peer mentorship programs support first-year students in adjusting to university life[1], industry mentorship programs are instrumental in further enhancing students' preparedness and self-confidence [2].

As part of the National Science Foundation (NSF) S-STEM project, our institution initiated an industry mentorship program in the third year of a broader engineering scholarship program. The program targeted students who had completed an introductory engineering course and were preparing for internships and career decisions. To align expectations among faculty, industry professionals, and project investigators, an orientation forum was held to emphasize the importance of communication, teamwork, and workplace observations. A subsequent meet-and-greet event introduced students to potential mentors and gathered mentors' preferences for communication and capacity for mentoring. Students selected their preferred mentors by rating qualities highlighted by Hoffmeister et al. [3], including effective listening, willingness to share honest feedback, and knowledge exchange.

Mentors were then assigned based on survey results, ensuring alignment between students' majors and mentors' professional backgrounds. Participating students were asked to schedule at least one meeting with their mentors and later completed a survey to evaluate the effectiveness of the mentoring experience. This paper discusses the implementation process and presents the initial findings from this industry mentorship program.

1.0 Introduction

The Angelo State Engineering Scholars (ASES) program was established through the NSF S-STEM initiative to enhance enrollment, increase graduation rates, and support workforce integration for low-income engineering students [4]. A central feature of this program is a multi-tiered mentoring structure—referred to as "mentoring familias"—that includes peer, faculty, and now industry mentors, designed to better bridge the gap between academic preparation and professional practice.

The program commenced in Fall 2022 with an inaugural cohort of eight students, comprising both first-time freshmen and transfer students. In the following year, 15 additional students joined, bringing the total to 23 participants. During the first two years, the program provided financial support and academic resources such as a credit-bearing course on engineering

leadership and career development, as well as faculty and peer mentorship. In the third year, the program introduced an industry mentorship initiative.

Industry mentorship complements existing faculty and peer mentorship structures by providing students with practical workplace insights. Previous studies have demonstrated the benefits of peer mentoring for new students adjusting to university, and extending these efforts to industry mentors offers valuable professional knowledge, ultimately easing students' transition into the workforce. Ilumoka et al. [2] found that including industry mentors significantly heightened student interest and confidence in STEM disciplines.

The subsequent sections detail the implementation of the industry mentorship program, including recruitment, orientation, mentor-mentee assignments, and preliminary assessment of the program's effectiveness.

2.0 Industry Mentoring Program Implementation

The recruitment of industry mentors began during the initial proposal stage of the S-STEM project. The principal investigators (PIs) held a meeting with the Department's industry partners to invite their participation in mentoring the program's scholars. Fifteen regional organizations representing civil, mechanical, aerospace, manufacturing, and transportation engineering agreed to each mentor two to three students. This arrangement allowed the program to accommodate the anticipated growth in student participation.

Two years into the program, the PIs contacted the industry partners again to identify experienced engineers within their organizations who could serve as mentors. In the inaugural meeting held at the end of Spring 2024, attendees confirmed three ways they could contribute to the program:

1. Retention and Graduation Rates: By fostering a sense of belonging and providing practical career guidance.

2. Professional Networks: Help students gain access to a strong regional industry network, facilitating connections that enhance employability and career development.

3. Workforce Preparedness: Mentors help students align their academic experiences with industry needs, equipping them with the skills and knowledge to excel in professional roles.

Industry leaders present at the meeting confirmed their willingness to participate as mentors in subsequent semesters.

At the beginning of the Fall 2024 semester, a meet-and-greet event was organized to introduce students to the industry mentors. Due to logistical constraints, the event was split into two

sessions: an in-person session for local mentors and a virtual session a week later for remote or otherwise unavailable mentors.

- In-Person Session: Eighteen mentors and 22 students participated in a "speed-dating" format, wherein each student spent three minutes with each mentor to exchange introductions and, as time allowed, discuss their backgrounds.

- Virtual Session: For mentors who could not attend in person, a similar format was conducted using breakout rooms. Students rotated through the rooms to meet each mentor, briefly introduce themselves, and ask questions.

After the meet-and-greet, mentors were emailed a survey to indicate the number of students they were able to mentor and their preferred communication methods. Students completed a corresponding survey to select up to five mentors based on 1) good listening skills, 2) willingness to share candid information, 3) approachability, and 4) provision of useful information. These criteria were adapted from Hoffmeister et al. [3].

A frequency matrix was generated to align students with mentors who appeared most frequently in the students' top selections and had professional expertise relevant to the students' respective majors. Assignments also considered mentors' stated capacity. Three mentors who did not respond to the mentee-capacity survey were assigned one student each.

Following the assignment, students received an email with their mentor's contact information and were instructed to introduce themselves via email and schedule a meeting. Mentors were notified of their mentee assignments and were asked to anticipate these introductory emails. Students were required to copy program coordinators on these introductory emails, which served as documentation for participation credit in the associated course.

By the end of the semester, 20 students reported having met with their assigned mentors. One student indicated difficulty scheduling a meeting due to a lack of mentor responsiveness. The PIs are currently working to secure an alternative mentor for this student in the next semester.

3.0 Lessons Learned in from Implementing the Industry Mentoring Program

The first-semester evaluation of the mentorship program through student surveys provided valuable insights into its effectiveness and areas for improvement. The survey findings underscored several lessons that can inform improvements in the mentoring program.

First, there is a clear need to set and communicate realistic expectations around interaction frequency. While most students met their mentors one to two times or five or more times, nearly half were dissatisfied with the number of meetings overall. Interestingly, students who met more frequently reported feeling "extremely dissatisfied," suggesting that quantity alone does not guarantee satisfaction if the interactions are not aligned with expectations.

Second, despite concerns about meeting frequency, mentor-mentee relationships were viewed positively in other areas. The overwhelming majority of students were either somewhat or extremely satisfied with their mentor assignments, indicating that the matching process is largely effective. Likewise, no students reported dissatisfaction with the quality of their interactions or their mentors' accessibility, highlighting that the program's communication channels and mentor engagement strategies are strong.

Third, the high level of satisfaction with the ASES support services and program structure signals that organizational aspects—such as the logistics of pairing, orientation, and ongoing support—are functioning well overall. However, the feedback suggests the "speed dating" format for initial introductions might be too hectic, pointing to the need for a more streamlined approach.

Finally, students emphasized the importance of real-world insights, networking opportunities, and personalized guidance on career decisions. These takeaways reinforce the program's value while identifying where additional clarity on meeting expectations could boost satisfaction, ensuring an even more meaningful experience for future cohorts.

4.0 Conclusion and Future Work

In its third year, the ASES program successfully implemented an industry mentorship component alongside existing peer and faculty mentoring structures. The findings from the first semester of implementation reveal that students generally value the quality of interactions and support, though some dissatisfaction arose regarding meeting frequency and the initial pairing process.

Based on the student feedback, the following improvements are recommended:

1. Meeting Frequency Expectation: Limit or set clear expectations for approximately four mentor-mentee interactions per semester, as more frequent meetings did not necessarily correlate with higher satisfaction.

2. Streamlining Introductions: Refine the "speed dating" process to reduce complexity and ensure that both in-person and virtual sessions are efficient.

3. Transparent Pairing Process: Provide more clarity about the mentor assignment methodology to foster a stronger sense of alignment and student agency.

4. Expanded Networking Events: Organize sessions where industry leaders share professional experiences and insights, reinforcing the program's emphasis on workforce readiness.

In conclusion, the industry mentorship program has yielded promising outcomes and provides a model that other institutions may adapt to enhance students' transition from academia to the

engineering workforce. Future iterations of the program will focus on implementing the aforementioned recommendations to optimize the mentoring experience.

Acknowledgements

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