2026 ASEE ANNUAL CONFERENCE June 21–24, 2026 | Charlotte Convention Center, NC
Host Sponsor UNC Charlotte
ASEE AMERICAN SOCIETY FOR ENGINEERING EDUCATION
Paper ID #53965

WIP-Operationalizing Career Guidance for Undergraduate Chemical Engineering Students: Design and Early Outcomes of an Industry Mentoring Program

Dr. Fernando Mérida, University of Florida

Fernando Mérida is an Instructional Assistant Professor in the Department of Chemical Engineering at the University of Florida. His teaching, scholarship, and service focus on engineering education, with particular emphasis on experiential and blended learning in chemical engineering. His research examines the design, implementation, and assessment of experiential learning modules, instructional innovation in transport phenomena and unit operations, mentoring and industry engagement, and curriculum internationalization through global learning initiatives. He also contributes to the development of instructional laboratory modules in biomolecular engineering and bioprocesses. Dr. Mérida received his B.S. in Chemical Engineering from Universidad de San Carlos de Guatemala and his M.S. and Ph.D. in Chemical Engineering from the University of Puerto Rico Mayagüez. His graduate research focused on bioprocess engineering and nanotechnology for biomedical applications. Prior to academia, he worked in quality systems and consulting for the food and beverage industry, and in scientific sales and technical services related to biomolecular and biotechnology technologies.

Dr. Dmitry Kopelevich, University of Florida

Dmitry Kopelevich received a dual Ph.D. degree in Chemical Engineering and Mathematics from the University of Notre Dame in 2002. He held a post-doctoral position at Princeton University from 2002 to 2003 and joined the faculty of the Department of Chemical Engineering at the University of Florida in 2003. He currently serves as Associate Chair for Undergraduate Studies at the Department of Chemical Engineering and a faculty advisor of the UF student chapter of AIChE.

Dr. Dane Boyington, Thinking Media

Dr. Dane Boyington is the CTO of Thinking Media. Dane also served as the Vice President, Workforce Curriculum, for the Workforce Development Division of ACT. Dane and Sheila's previous educational technology firm was acquired by private equity in 2022, and by Pearson Education in 2025, and included Learning Blade®, a STEM career awareness platform and Ready for Industry®, a career preparedness system for industry. Dane and Sheila were also the creators of ACT's KeyTrain® system for WorkKeys® (acquired by ACT in 2011) with over 28 state contracts. Dane holds a doctorate in Chemical Engineering from the University of California at Berkeley, and a B.S.in Chemical Engineering from the University of Florida with high honors.

Ms. Sheila Boyington, Thinking Media

Sheila C. Boyington, P.E. is the CEO of Thinking Media, the current Board Chair of Erlanger Health, and previously served on the Tennessee Board of Regents Foundation Board. Sheila also served as the Vice President for ACT Workforce and led the sales and implementation team for the ACT NCRC / WorkKeys® / KeyTrain® team nationally. Sheila and Dane's previous educational technology firm was acquired by private equity in 2022, and by Pearson Education in 2025, and included Learning Blade®, a STEM career awareness platform and Ready for Industry®, a career preparedness system for industry. They were also the creators of ACT's KeyTrain® system for WorkKeys® (acquired by ACT in 2011) with over 28 state contracts. Sheila serves as the National States Chair for Million Women Mentors. Sheila is a Professional Engineer and holds a M.S. in Civil/Environmental Engineering from the University of California at Berkeley and a B.S. in Chemical Engineering from the University of Florida.

Paulette Woodson Figueroa

Work-in-Progress: Operationalizing Career Guidance for Undergraduate Chemical Engineering Students: Design and Early Outcomes of an Industry Mentoring Program

1. INTRODUCTION

Undergraduate chemical engineering (ChE) students progressively need early, personalized guidance to navigate career pathways, make informed academic choices, and approach recruiting with confidence amid evolving industry expectations. Mentoring can help meet these needs by providing career-relevant insight and professional connections that are not always visible through coursework, and prior work links mentoring to outcomes such as connectedness and access to social support/social capital [1]. At the University of Florida, surveys of recent graduates and listening sessions with current students indicated uncertainty about electives and career direction, anxiety about interviews and career fairs, and stronger employment outcomes among students who had internships and mentoring. While the Careers Connection Center offers effective career preparation networking opportunities, and connections to prospective employers, it does not tailor to the specific needs of ChE students or provide experience-based insight like those of a field engineer. These findings motivated a scalable, department-wide approach that extends beyond informal advising and broad institutional resources [2].

This work-in-progress paper presents the design and early outcomes of a department-wide Industry Mentoring Program (IMP) co-led by ChE faculty, the AIChE Student Chapter, and members of the Industry Advisory Board of the Chemical Engineering Department at the University of Florida. The IMP aims to connect students directly with alumni and industry mentors for recurring, low-burden conversations focused on career exploration and professional skill-building. The program design draws on mentoring best-practice guidance emphasizing intentional program structures, clear expectations, and support for effective mentor–mentee interactions [3].

2. MODEL BACKGROUND

2.1 Career Readiness and Experiential Learning in Chemical Engineering

The transition of engineering students from coursework to professional practice is shaped not only by academic formation and technical preparation, but also by early exposure to career pathways and opportunities to develop workplace-relevant skills. Internships are commonly framed as a work-integrated learning mechanism that provides structured, supervised experiences in authentic professional environments and supports the transition from higher education to the labor market [2], [4]. Work-integrated learning experiences have been associated with improved role clarity, self-efficacy, and alignment between students' aspirations and occupational realities, which can support smoother transitions from school to work [5]. There is strong evidence suggesting that internships can meaningfully influence hiring signals, including experimental studies dealing with early career hiring processes that have found that internship experience can increase the likelihood of being invited to a job interview [6], [7].

Within chemical engineering, students often face early decisions such as elective planning, course sequence, and specialization, that can influence access to internships, research, and co-curricular leadership opportunities. These decisions are not purely academic; they also depend on students'

understanding of industry sectors, recruiting timelines, and professional expectations that may not be explicit in required coursework. This creates a departmental need for scalable support that help students interpret career options early, act on opportunities at the right time, and build confidence for high-stakes events such as career fairs and interviews. As a result, departments have increasing motivation to provide career-relevant guidance early in the program, particularly for students who have less access to informal professional networks [8], [9].

2.2 Mentoring as a Mechanism for Access, Confidence, and Professional Networks

Engineering education research highlights the role of mentoring in developing "social community" outcomes among students, including connectedness, satisfaction, resilience, and social capital [1]. These outcomes can certainly shape how students experience their engineering environment and how confidently they navigate professional transitions. As such, mentoring can be viewed through this lens: mentors can help students access resources embedded in professional networks, thus providing information, referrals, norms, and confidence-building feedback that may otherwise be unevenly distributed. Furthermore, mentoring programs are most effective when they are intentionally structured through clear expectations, shared goals, and reflective practices. These design principles are especially relevant in chemical engineering departments where students must make early, high-impact choices about electives, experiential learning, and career exploration, often before they fully understand sector-specific pathways and recruiting timelines [10], [11].

2.3 Creating an Industry Mentoring Program Based on Departmental Needs

Guided by the mentoring literature summarized above and informed by a local needs assessment, the Chemical Engineering Department at the University of Florida established the Industry Mentoring Program (IMP) as a structured, scalable mechanism for connecting students with alumni and industry mentors. Departmental surveys of recent graduates and listening sessions with current students identified recurring barriers to career preparation, including uncertainty about elective selection and industry pathways, anxiety about interviews and career fairs, and a need for practical guidance on balancing academics with professional development. Although departmental outcomes show a strong experiential-learning culture among the 2023–2024 cohort (77% completed at least one internship, 59% participated in undergraduate research, and about 78% accepted a job offer at graduation), students still reported limited confidence in making career decisions, particularly earlier in the curriculum when participation in internships and research is lower. Recruiting and student-interest data further support the need for early mentoring: the main hiring sectors include Pharma/Medical (15%), Electronic Materials (13%), Food & Drinks (12%), Energy (12%), and Consumer Products (7%), while incoming sophomores most often report interests in Energy/Sustainability (21%), Food & Drinks (19%), and Biotech/Pharma (18%). The IMP was therefore designed to bridge early student interests, departmental pathways, and industry expectations through intentional, sector-informed mentoring

3. MODEL PLANNING

3.1 Program Governance, Recruitment, and Operations

The IMP governance intentionally distributed responsibilities across three stakeholder groups to support scalability and continuity: a) faculty, b) AIChE Student chapter, and c) the department's Industry Advisory Board (AB). Table 1 summarizes the role distribution and workflow. Prior work illustrates that meaningful industry engagement in engineering programs is often most sustainable

when responsibilities are shared across faculty leadership, student organization infrastructure, and industry partners, including alumni [12], [13].

Table 1 - IMP governance structure and tasks

Stakeholder Group	Personnel	Tasks	Key Outputs
Faculty lead	One member	Program oversight, alignment with departmental priorities, matching oversight, coordination with AB	Final match approval (as needed), program guidelines, report to AB and department
AIChE Student Chapter	Two officers	Operational management, mentee recruitment, student/mentor communications, enrollment administration, matching logistics, tracking participation	Enrollment forms, match lists, communications, meeting reminders, participation tracking
Advisory Board (AB)	Two members	Mentor recruitment strategy; program design input, matching logistics	Recruitment emails, mentor pipeline, design recommendations

Mentor recruitment for the Fall 2025 iteration leveraged alumni and industry networks, using alumni databases and two AB members reaching potential mentors to introduce the program, clarify expectations, and invite participation. An intake survey (Google Forms) was sent to alumni requesting personal and professional information including graduation year, current employer and position, years of professional experience in ChE or related, and industry sector. Additionally, the survey asked for participation preferences such as meeting frequency, communication channel, mentee capacity, and preferred type of guidance.

Mentee recruitment was primarily conducted through AIChE officers advertising the program through various channels including announcements in AIChE general body meetings, Slack messages, and posts in social media. Furthermore, one-on-one conversations were also held with interested students, emphasizing that the program was open to students across all class years. In all these channels, the link to a mentee intake survey (Google Forms) was shared thus enabling potential mentees to indicate contact information, academic standing, industry of interest, meeting availability and frequency, and goals during the mentoring process. The program's main incentive was presented as a combination of networking opportunities, experience-based guidance, and facilitated access to professional resources.

Mentor-mentee matching was completed using both intake surveys through a manual, interest-based process coordinated by the AIChE officers and AB members, reviewed with faculty oversight. Mentors were typically matched with one student, with some mentors supporting up to two students. Mentors and mentees met online for approximately 30 minutes per session, with conversations guided by suggested topics.

4. MODEL DEVELOPMENT AND ASSESSMENT

4.1 Spring 2025 Pilot and Fall 2025 First Iteration

The IMP was first developed and tested through a Spring 2025 pilot, implemented with a small cohort. The pilot's primary purpose was feasibility testing: confirming that mentor recruitment, matching, and short online meetings could be executed with low logistical burden while producing useful interactions. Pilot mentor–mentee pairs met once or twice, with each meeting lasting approximately 30 minutes. Mentors provided guidance on career pathways, access to resources, networking, and early professional planning, while mentees asked questions, discussed perceived limitations or challenges, and articulated professional interests. Feedback during the pilot was collected informally from both mentors and mentees (e.g., email comments and verbal reflections) and used to inform program revisions.

Based on pilot feedback, the IMP moved to its first official implementation in Fall 2025. The Fall rollout expanded participation. The first iteration had an increased structure in four ways: (1) a more formalized matching workflow, (2) a consistent meeting cadence of monthly 30-minute online meetings, (3) a curated set of suggested monthly discussion topics to guide conversations and improve consistency across pairs, and (4) planned end-of-semester surveys to map the students' perceptions and confidence (Satisfaction Survey), and their desire to continue in the program in the following semester (Preferences Survey). Table 2 compares the Spring pilot to the Fall implementation. Examples of suggested monthly topics include career pathways to industry, internship and job search strategies, workplace dynamics, and technical skills/resume building.

Table 2 - Implementation summary: Spring 2025 pilot vs Fall 2025 first iteration

Feature	Spring 2025 Pilot	Fall 2025 Implementation
Scale	Small group	~ 44 enrolled; 39 pairs recorded as of Oct 2025
Meetings (30 minutes; online)	1 – 2 meetings total	Monthly meetings (5)
Structure provided to pairs	General expectations	Suggested monthly topics; clearer cadence/expectations
Matching process	Informal/manual	Structured matching using intake surveys
Feedback/evaluation/ desire to continue	Informal mentor/mentee feedback	Satisfaction and Preferences surveys

4.2 Instruments and Assessment

The Fall 2025 iteration used the Mentoring Satisfaction and Mentoring Preferences surveys (for mentors and mentees) via Google Forms, upon completion of the program. The Satisfaction survey was administered anonymously and assessed perceived value as well as self-reported changes in career goals for mentees. The survey included Likert-scale questions dealing with mentor-mentee interactions (e.g., communication effectiveness, meeting frequency, discussed topics, conversation helpfulness), self-reported perceived impact (feeling better equipped to achieve professional

goals), likelihood of remaining in the program, and overall satisfaction. A feedback question on suggestions for improvements was also included. The survey ends with an open-ended prompt for suggestions and additional comments, like those reported in the literature [16] [14], [15].

The Preferences survey collected names and e-mail for tracking purposes, and it was designed with two questions. The first one asked both parties if they wish to continue in the program either with the current or a different pairing, or if they opt for not continuing in the program. The second question asked for feedback by providing a link to an anonymous survey, aiming to collect constructive feedback. In parallel, the AIChE officers and faculty lead tracked operational metrics such as enrollment counts, number of pairs, and participation trends (see Table 3)

Table 3 - Data sources and instruments used in Fall 2025

Instrument/ Data Source	Audience	Timing	Purpose	Key Construct Examples
Intake survey	Mentors and mentees	August 2025	Enrollment + baseline; supports matching/assessment	Contact information, academic standing, industry interests, baseline career goals
Mid-program feedback request email	Mentees	October	Present mentees' preliminary feedback at the Advisory Board meeting	Free-text preliminary feedback; names were removed from slides presented to the AB
Satisfaction and Preferences surveys	Mentors and mentees	January 2026	Program value, map changes, and improvement suggestions	Perceived value and satisfaction, confidence in career goals, continuation intent, and recommendations

The various phases of the IMP model are shown in Figure 1. The diagram summarizes the progression from the pilot to first implementation, highlighting key design elements and the complementary assessment components used to support iteration, including intake data, end-of-program surveys (Satisfaction and Preferences), mid-program feedback for the AB meeting, and operational tracking. These structured response formats enable consistent aggregation across participants, while the final open-ended prompt provides space for respondents to elaborate on experiences and offer targeted suggestions for the improvement of the program.

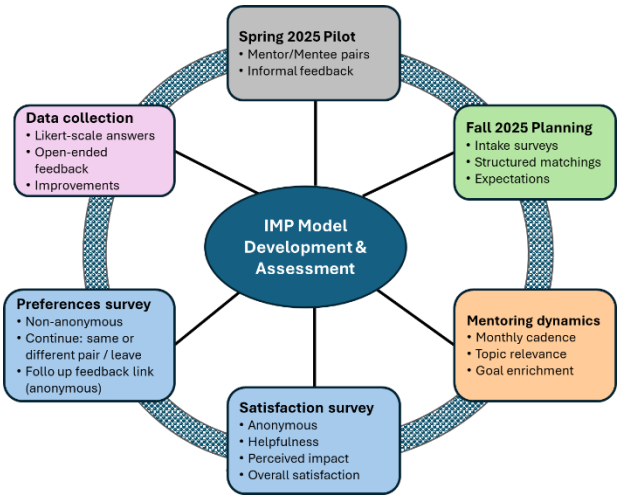

Figure 1 - Industry Mentoring Program (IMP) model development and assessment map

5. CURRENT STATUS AND PRELIMINARY OUTCOMES

6.1 Mentoring Satisfaction Survey

The Fall 2025 iteration of the program included 39 active mentor–mentee pairs. End-of-semester post-survey responses were received from 22 participants (14 mentors and 8 mentees). Qualitative comments indicate that participants generally view the program as a promising and departmentally valuable initiative that should continue and become more visible. At the same time, the most consistent challenge (primarily reported by mentors) was loss of contact or limited engagement from mentees after an initial interaction, which reduced continuity and limited the program's impact for those pairs. Additional feedback highlighted opportunities to (i) strengthen communication channels and early contact verification (e.g., collecting an alternate contact method), (ii) streamline and clarify administrative onboarding requirements for mentors, and (iii) tailor discussion prompts to students' academic level while adding community-building touchpoints (e.g., mixers).

Table 4 - Summary of qualitative themes from end-of-program survey comments

Theme	What it indicates	Illustrative evidence from responses	Implications for improvement
Perceived value and continuity interest	When pairs engage, participants view the IMP as useful and worth continuing.	*"The program will continue to flourish…" / "fun program… a lot of insight" / "valuable information"*	Maintain the program structure, sustain mentor recruitment, and continue regular reminders.
Engagement and communication gaps	The main barrier was loss of contact or inconsistent follow-through after initial meetings.	*"First conversation and then no further contact." / "My mentee never reached out…" / "missed scheduled conversations…"*	Add early contact verification, response-time expectations, and a clear re-matching/offboarding process
Refinements for scaffolding and logistics	Respondents requested better tailoring by student level, more community touchpoints, and clearer onboarding processes.	*"tailored to younger students…" / "More mixers…" / "onboarding checklist… ideal"*	Tailor prompts by academic stage, pilot mixers/small-group touchpoints, and provide a clear mentor onboarding checklist.

6.2 Mentoring Preferences Survey

Responses were received from 38 participants (68.4% mentors, 31.6% mentees). A majority of respondents (57.9%) indicated a preference to continue with their current partner, while a small 5% (mostly mentees) reported that they did not plan to participate in the upcoming semester, or never responded to the survey. No further follow-up was conducted given the small percentage. Qualitative comments reinforced that successful mentoring is perceived as reciprocal and "active," with repeated emphasis on mentee responsiveness and genuine interest.

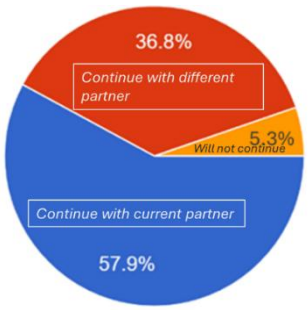

Figure 2 - Mentoring preferences survey: intention to continue and partner preference (n = 38).

Participants also valued program scaffolding, especially monthly reminders and suggested discussion topics. They also requested additional flexibility such as small-group conversations or mixers to address common recruitment and career fair questions. Together, these results suggest that while most participants wish to remain engaged, improving early engagement verification and offering structured re-matching pathways may help reduce stalled pairings and better align mentor–mentee expectations.

6. REFLECTION AND FUTURE WORK

Based on these positive findings and identified improvement opportunities, here are the next steps to plan for subsequent iterations of the program:

A. Strengthen engagement reliability and increase survey response by centralizing partner communication via Slack and incorporating a monthly poll to check for the progress of mentoring pairs.
B. Refined short onboarding module that sets expectations for time requirement, responsiveness, and professional etiquette, paired with a clear re-matching/offboarding pathway when communication breaks down. A streamlined mechanism for participants requesting a different partner can be incorporated.
C. Pilot optional small-group sessions or mixers (virtual and, when feasible, in-person) to cover common recruiting and career-fair questions, and to engage freshmen and sophomores.
D. Short monthly surveys to track for continued commitment will be incorporated to keep mentees accountable for meeting their mentors, track for upcoming meetings (e.g., sending reminders), and ask for rated experience.

7. REFERENCES

[1] Washington, V., & Mondisa, J. L. (2021). A need for engagement opportunities and personal connections: Understanding the social community outcomes of engineering undergraduates in a mentoring program. *Journal of Engineering Education*, *110*(4), 902-924.

[2] Nogueira, T., Magano, J., Fontão, E., Sousa, M., & Leite, Â. (2021). Engineering students' industrial internship experience perception and satisfaction: Work experience scale validation. *Education Sciences*, *11*(11), 671.

[3] Byars-Winston, A., & Dahlberg, M. L. (2019). *The Science of Effective Mentorship in STEMM. Consensus Study Report*. National Academies Press. 500 Fifth Street NW, Washington, DC 20001

[4] Karunaratne, K., & Perera, N. (2019). Students' perception on the effectiveness of industrial internship program. *Education Quarterly Reviews*, *2*(4)

[5] Musa, S., Nurhayati, S., & Boriboon, G. (2025). The Effect of Internships on Graduates' Employability, Soft Skills, and Digital Competence. *Educational Process: International Journal*, *17*, e2025306

[6] Baert, S., Neyt, B., Siedler, T., Tobback, I., & Verhaest, D. (2021). Student internships and employment opportunities after graduation: A field experiment. *Economics of Education Review*, *83*, 102141.

[7] Di Meglio, G., Barge-Gil, A., Camiña, E., & Moreno, L. (2022). Knocking on employment's door: Internships and job attainment. *Higher Education*, *83*(1), 137-161.
[8] Schadl, B., Sheppard, S., & Chen, H. L. (2017, June). Career certainty: Differences between career certain and uncertain engineering students. In *2017 ASEE Annual Conference & Exposition*
[9] Carrico, C., Matusovich, H. M., & Bhaduri, S. (2023, June). Preparing engineering students to find the best job fit: Starting early with the career development process. In *2023 ASEE Annual Conference & Exposition*.
[10] Halupa, C., & Henry, M. (2015). Using VineUp to Match Students with Alumni Industry Mentors in Engineering: A Pilot Study. *International Journal of Higher Education*, *4*(4), 105-112.
[11] Becerra-Fernandez, I., Campbell, R., Roig, G., & Hopkins, G. (1997, June). Mentoring minority engineering students: A program at Florida International University. In *1997 Annual Conference* (pp. 2-291).
[12] Jahan, K., Torlapati, J., & Atchison, J. S. (2025, June). Engaging your Industrial Advisory Board to promote Industrial Connections for Student Engagement. In *2025 ASEE Annual Conference & Exposition*.
[13] Jerpoth, S. S., Hesketh, R. P., Yenkie, K. M., Slater, C. S., Curtis, S., Fracchiolla, M., & Theuma, D. A. (2023, June). Hands-on Experience in Solving Real-World Problems via a Unique Student-Faculty-Industry Collaboration Program. In *2023 ASEE Annual Conference & Exposition*.
[14] Arinze, L. C., Beagle, J. M., & McDermott, J. E. (2023, June). Assessing the Effectiveness of the GradTrack Virtual Mentoring Program. In *2023 ASEE Annual Conference & Exposition*.
[15] Acton, K., Holte, J. E., Besser, D., & Nepal, K. (2024, June). Board 184: A Layered Mentoring Approach for Engineering Excellence. In *2024 ASEE Annual Conference & Exposition*.
[16] Burleson, G., & Harper, J. (2025, June). Connecting academia and industry: Piloting an industry mentor program in a first-year engineering design course. In *2025 ASEE Annual Conference & Exposition*.