

Engineering Student Retention: Integrating Corporate Onboarding Practices with Social Identity and Self-Determination Theories

Dr. Hai T Ho, Kennesaw State University

Hai T. Ho, Ph.D., NPDP, ABET PEV - Dedicated faculty, coach, and mentor who helps others reach their full potential. An industry expert in leadership, management, and product development.

* Over 25 years of industry experience ranging from start-up to Fortune 500. * Named inventor on 17 patents and numerous innovations. * Ten plus years academia as department chair and faculty. * Coached and mentor many dozens of students and young professionals through KSU and Millennial Leadership Academy (MLA). * Former VP of Product Development at HID Global and Newell Rubbermaid. * Developed and launched over 30 electro-mechanical products. * Strong technical background in Control Systems, Product Development, and AI Machine Learning * Products won Red Dot, iF, and PC Magazine Editor's choice awards. * PDMA certified New Product Development Professional (NPDP). * Experienced in program management, systems engineering, and training. * Successfully managed overseas contract manufacturers and outsourcing partners. * Managed multi-disciplined organization: EE, ME, SW, ID, PMO, TE, FW, HW, DOC, CE. * Managed teams across U.S., Europe, and Asia. * ABET PEV * Active community leader * Certified John Maxwell leadership coach and speaker

Prof. Scott J. Tippens, Kennesaw State University

I am a full professor at Southern Polytechnic State University and I am the founding director of the Alternative Energy Innovation Center at SPSU. I've been teaching in the Electrical and Computer Engineering Technology department for approximately 17 ye

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Abstract

Retention in engineering disciplines remains a persistent challenge for higher education. This study explores a novel approach inspired by corporate onboarding practices to enhance retention among first-year computer engineering (CPE) students. Leveraging Social Identity Theory (SIT) and Self-Determination Theory (SDT), the proposed year-long onboarding program emphasizes belonging, competence, and autonomy to foster student engagement. Insights from a survey of lower-classmen CPE students reveal important gaps in belonging, confidence, and industry connections. The program incorporates mentorship, hands-on learning, and industry engagement as core components. The program draws on multiple support resources, including teaching-focused faculty, an active Industrial Advisory Board (IAB), and senior student mentors from the CPE Apprentice Club, to ensure sustainability and impact. While this paper outlines the proposed framework, a future "Phase-2" study will report on the program's implementation and outcomes. By integrating mentorship, hands-on learning, and industry engagement, this initiative aims to set a new standard for student development and retention.

Introduction

Retention of engineering students is a crucial concern for higher education institutions. Many students, particularly in rigorous fields like computer engineering, face challenges such as academic pressures, lack of belonging, and unclear professional pathways [1], [2]. At the author's university, the CPE department seeks innovative approaches to address these issues, aiming to improve retention and graduation rates [3], [4].

This paper introduces a comprehensive onboarding program inspired by corporate practices, tailored to first-year CPE students. Grounded in SIT and SDT, the program combines academic, social, and professional development components to address student needs holistically [5], [6]. By integrating mentorship, industry engagement, and structured support systems, the program aligns academic success with career readiness.

Theoretical Framework

Social Identity Theory (SIT)

SIT posits that individuals derive self-esteem and identity from group membership. Within the context of our CPE program, fostering a sense of belonging within the CPE community can significantly improve student engagement and retention [7]. A strong group identity helps students overcome challenges and feel connected to their peers, faculty, and field of study [8].

Self-Determination Theory (SDT)

SDT identifies three core psychological needs—autonomy, competence, and relatedness—as drivers of intrinsic motivation. Supporting these needs in the educational setting empowers

students to take ownership of their learning, persevere through difficulties, and build confidence in their capabilities [9].

Together, SIT and SDT provide a robust framework for designing interventions that address both community integration and individual motivation [10].

Survey Insights

A survey of lower-classmen CPE students provided critical insights into their experiences and needs:

- **Sense of Belonging:** Only 51% of students reported a strong sense of belonging (ratings of 4 or 5 out of 5).
- **Confidence in Success:** Just 22% of students rated their confidence in succeeding as "very high" (5 out of 5).
- **Preferred Mentorship:** Industry professionals were the most preferred mentors, chosen by 15 students [3].
- **Interest in Industry Engagement:** A majority of respondents (27 students) expressed strong interest in industry-focused activities [3].

Table 1 – Key Survey Insights

Metric	Percentage/Count
Sense of Belonging (4-5)	51% (23 students)
Confidence in Success (5/5)	22% (10 students)
Preferred Mentorship: Industry	15 students
Interest in Industry Engagement	27 students

These results highlight the need for a structured onboarding program that integrates academic support, professional exposure, and community-building efforts [6].

Proposed Year-Long Onboarding Program

Semester 1: Building Belonging and Identity

The first semester focuses on helping students feel connected to the CPE community while building foundational academic and professional skills [9].

1. Pre-Orientation Engagement:

- Personalized welcome kits featuring faculty introductions, an academic roadmap, and CPE career pathways.
- Virtual meet-and-greet sessions with faculty, mentors, and peers to establish early connections.

2. Faculty and Peer Mentorship:

- Students are paired with senior peers for guidance on navigating coursework and campus life.
- Faculty advisors meet with students regularly to discuss academic progress and career goals.

3. Community Workshops and Activities:

- Weekly workshops on time management, study strategies, and navigating the engineering curriculum.
- Team-building activities such as problem-solving projects to promote collaboration.

4. Industry Exposure:

- Organized field trips to local engineering firms and technology companies, offering students firsthand exposure to professional environments.

Semester 2: Fostering Professional Growth and Autonomy

The second semester builds on the foundations of belonging and identity, focusing on deeper industry engagement and skill development [8].

1. Industry Mentorship:

- Faculty and the CPE department coordinate with industry partners to match students with professionals in their areas of interest.

2. Hands-On Projects:

- Students participate in industry-inspired projects, culminating in interpersonal presentations to faculty and industry representatives during a department showcase.

3. Networking Opportunities:

- Formal events such as alumni mixers and career panels hosted by the CPE department.

4. Advanced Skill Development Workshops:

- Topics include internship-seeking resume building, technical interviews, and career planning, co-led by faculty and industry experts.

Faculty and Departmental Support

The success of this program depends on active collaboration between the CPE faculty and department [3]:

- **Faculty Contributions:** Faculty will oversee mentorship pairings, lead workshops, and serve as advisors. Their involvement ensures alignment with academic and career objectives [4].
- **Departmental Roles:** The CPE department will secure funding for activities, coordinate industry partnerships, and provide logistical support for field trips and events [5].

- Industry Collaboration: Partnerships with local companies will provide mentorship, project sponsorship, and opportunities for field trips [6].

By embedding this program within the CPE curriculum, the department ensures that onboarding activities are integral to the student experience rather than supplementary [8].

Discussion

The proposed program aligns with SIT and SDT by addressing students' psychological needs for belonging, competence, and autonomy. By integrating mentorship, community activities, and industry engagement, the program provides a holistic approach to student development. Faculty and departmental involvement ensure that these initiatives are both sustainable and impactful.

Field trips, mentorship by industry professionals, and hands-on projects bridge the gap between academic learning and professional aspirations, offering students a clearer path to success. While challenges such as securing consistent industry participation may arise, the program's design allows for adaptability and continuous improvement.

Conclusions and Discussions

Retention challenges in engineering education demand innovative solutions. The proposed year-long onboarding program that integrates corporate onboarding practices with academic and professional development, creating a robust framework for student success. With strong support from faculty, the CPE department, and industry partners, this program aims to set a new standard for retaining and developing future engineers.

While the program has not yet been implemented, this work serves as a foundational framework to guide future efforts. A subsequent "Phase-2" paper will report on the results and outcomes after running the program, including its impact on student retention, engagement, and professional development. By sharing this initial plan, we aim to foster discussion and gather feedback that can further refine the initiative before its implementation.

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