Re-imagining a Culture of Student Leadership Development

College of Engineering & Applied Science (CEAS)
University of Colorado Boulder

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ProReady

Purpose

Developing leadership skills is an important aspect of engineering education. CEAS has committed to student leadership development (SLD) in its Strategic Vision under the pillar of "Embrace Our Public Mission," calling for the College to "[produce] well-rounded engineers with knowledge and skills in ethics, **leadership**, business and communication."[1]

Moreover, a growing body of research in engineering education signals the importance of leadership development, while industry partners cite leadership traits as highly desirable when recruiting and hiring students. Finally, ABET's latest assessment criteria evaluates engineering graduates on "an ability to function effectively on a team whose members together provide **leadership**, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives."[2]

SLD occurs throughout CEAS through a wide variety of formal and informal programs and activities, most of which are siloed and disjointed from one another. Overall, the College lacks a coherent vision for facilitating intentional SLD as an integral aspect of the student experience. As such, this report will:

1. Define the competencies associated with leadership development
2. Identify where SLD occurs within CEAS and across campus
3. Provide a Strategic Vision and Pillars for institutionalizing SLD as an integral aspect of a CEAS education

Leadership Development: Relevance and Common Competencies

The CEAS 2020 Employer Survey found that 59% of respondents rated leadership as an essential quality when making hiring decisions, with surveys outside the College corroborating these findings. The same Employer Survey also found near-universal agreement that problem solving, communication, teamwork, and professionalism are essential traits they seek in their workforce—competencies that are widely associated with leadership development.

The term "leadership" is broad and variably defined across engineering sectors, leaving engineering educators without consensus on a working definition. Research from engineering education research provide examples, with the most robust body of literature from civil and construction engineering. In a meta-analysis[3] of publications from the American Society of Civil Engineers (ASCE), the authors identify various attributes, competencies, and skills associated with leadership, including:

- Communication
- Collaboration & teamwork
- Vision & direction
- Interpersonal skills
- Motivation
- Ethics & integrity

- Drive & initiative
- Organization & structure
- Decision making
- Time management
- Technical knowledge

From this list the authors note that the first three traits (communication, collaboration & teamwork, and vision & direction) were almost unanimously cited among ASCE publications on leadership development.

Along the same lines, findings[4] from an analysis of common themes within engineering leadership programs closely support the ASEE publications analysis, finding that technical mastery, teamwork, contextual awareness, and effectual behavior comprise the focus of these programs. Similarly, a survey[5] of practicing engineers cites three leadership orientations within their field: technical mastery, collaborative optimization, and organizational innovation. Taken together - and including the aforementioned ABET assessment criteria - these analyses highlight the collection of skills and competencies effective engineering leaders must demonstrate.

[3] Handley, M., Plumblee, J. M., II, & Erdman, A. M. (2018). The Engineering Leader of the Future: Research and ... Retrieved from https://www.asee.org/public/conferences/106/papers/21520/download

[4] Kendall, M. R., Chachra, D., Roach, K., Tilley, E., & Gipson, K. G. (2018). 2020 ASEE Virtual Annual Conference Content Access. Retrieved from https://www.asee.org/public/conferences/172/papers/30570/view

[5] Rottmann, C., Sack, R., & Reeve, D. (2015). Engineering leadership: Grounding leadership theory in engineers' professional, 2015. Retrieved from https://journals.sagepub.com/doi/abs/10.1177/1742715014543581

Current SLD Opportunities

CEAS students hone their leadership skills in nearly all aspects of their educational experience, whether consciously or not. SLD occurs most often in the following arenas:

- **Academics:**
  - Engineering Leadership Program (ELP)
  - Engineering Management Program (EMP)
  - Projects progression into senior capstone projects
- **BOLD Center:**
  - Engagement Scholars
  - GoldShirt Program
  - Leadership Scholars
  - Peer Mentors
  - Student societies
  - Student tutors
- **Tutor, Mentor, and Ambassador Programs:**
  - BOLD Center (see above)
  - COEN 1830 Peer Mentors
  - Course & Learning Assistants
  - Departmental peer and alumni mentor programs
  - Engineering Ambassadors
  - Peer Academic Coaches
- **Student organizations and professional societies (engineering/computing-related)**
- **Student advisory boards:**
  - EDAB: Engineering Dean's Advisory Board
  - GSAB: Graduate Student Advisory Board
  - ISAB: International Student Advisory Board
  - UCEC: University of Colorado Engineering Council
- **ProReady Program Portfolio:**
  - Active Learning
  - Education Abroad
  - Internships and Co-ops
- **Campus Leadership Opportunities:**
  - Athletics
  - Catalyze CU
  - Leadership Minor
  - New Venture Challenge
  - Performing arts
  - President's Leadership Class (PLC)
  - Reserve Officers' Training Corps (ROTC)
  - Student societies and groups (non-engineering/computing)

Student Leadership Development (SLD)
Strategic Vision & Pillars

Given the broad foundation of existing SLD opportunities and momentum behind the ProReady initiative, the College is well-positioned to achieve a Strategic Vision "to provide intentional opportunity for all CEAS students to develop leadership competencies." We can achieve this Strategic Vision through the following Pillars:

1. Create a culture in CEAS that names and values leadership and unifies SLD efforts

2. Build on our existing SLD initiatives

3. Complement current offerings with signature programs and new micro-credentials

4. Commit and align financial, human, and analytical resources

Pillar #1: Create a culture in CEAS that names and values SLD and aligns SLD efforts.

CEAS will work proactively to create a culture where SLD is a foundational part of a student's ProReady experience. To achieve this goal, action items may include to:

- Update the College's Strategic Vision to include a specific commitment to SLD

- Convene a cross-College committee to develop an SLD mission statement with appropriate goals, learning outcomes, and key performance indicators to anchor current and future leadership initiatives

- Cultivate support for SLD by involving a range of key stakeholders in the development of SLD initiatives

- Amplify SLD as a core component of the ProReady initiative, focusing on the professional skills and workplace competencies that comprise leadership

Pillar #2: Build on existing SLD opportunities to innovate and scale for increased student engagement

CEAS is already doing notable work in the SLD space, providing a sound foundation for intentional and sustainable growth of future SLD initiatives. Opportunities may include to:

- Amplify where SLD already occurs within the ProReady portfolio, across the College, and at CU

- Partner with academic programs (including ELP and the Leadership Studies Minor) to strategically expand opportunities while integrating leadership theory into co-curricular SLD offerings

- Partner with CEAS faculty and departments to intentionally integrate SLD into the curriculum

- Provide faculty advisors of student organizations and professional societies tools to better facilitate SLD amongst their membership

- Involve Alumni and the ForeverBuffs network in developing and implementing opportunities for SLD

Pillar #3: Complement current SLD offerings with signature programs and new micro-credentials.

Strategic new programming will signal the importance of SLD and provide opportunities to acquire and hone the foundational skills needed to excel in engineering leadership settings. To achieve this goal, action items may include to:

- Develop an immersive and comprehensive **annual leadership summit** for CEAS students, including group leaders, mentors, coaches, and tutors

- Develop a **professional skills certification** in collaboration with Engineering Career Services, since professional skills are a critical foundation for effective SLD

- Develop a **College-wide internships course through EMP**; create synergies with departments already doing this (e.g. EE/ECE)

- Create intentional SLD linkages to COEN 1830: Engineering First-Year Symposium

- Foster partnerships with Residence Life staff to integrate SLD into the on-campus living experience

Pillar #4. Commit and align financial, human, and analytical resources

The commitment and alignment of financial, human, and analytical resources will ensure the long-term growth and sustainability of SLD within the College. To achieve this goal, action items may include to:

- Allocate 1.0 FTE for a professional staff member to lead and implement a comprehensive SLD program rooted in the College's SLD Strategic Vision and Pillars

- Allocate appropriate operating budget and leverage all possible funding sources (e.g. CU/CEAS funds, Engineering Excellence Fund, external grants, corporate sponsorships, alumni donations, etc.)

- Develop and implement a comprehensive SLD assessment plan to measure for impact, effectiveness, and areas for improvement.