

## **Building Engineering Leaders: The Power of Storytelling**

### **Stacie Edington, University of Michigan**

Stacie Edington is the Director of Honors and Engagement Programs within the University of Michigan, College of Engineering. She received her Bachelor of Arts in Sociology from the University of Michigan and her Master of Science in Executive Leadership from the University of San Diego. In addition to serving on the instructional team for "Engineering 110: Design Your Engineering Experience", she teaches the Engineering Honors Seminar, directs the College of Engineering Honors Program and oversees the Michigan Engineering Common Reading Experience. Beyond the University of Michigan, she is a Co-Lead Facilitator for LeaderShape.

### **Mr. Michael Dailey, University of Michigan**

Mike serves as the Associate Director of the Engineering Honors & Engagement Programs office at the University of Michigan, and is the lead instructor for ENGR 499: Design Your Engineering Future.

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## **Introduction**

Communication serves as an important skill for engineering leaders, enabling them to convey complex ideas, inspire teams, and navigate professional environments. Additionally, in today's rapidly changing world, engineers require both creativity and empathy to solve complex human and societal problems. However, significant declines have been observed in both creativity and empathy over the past several decades, with college students exhibiting lower levels of empathic concern and perspective-taking compared to previous generations [1], [2]. Storytelling is increasingly recognized as a central technique for fostering these key leadership skills that engineers need to be successful [3]. While storytelling has been used in many academic fields, its structured application within engineering leadership development remains relatively new.

In this practice paper, we share a selection of curricular and co-curricular initiatives that incorporate storytelling into engineering education. Drawing on experience within multiple courses and programs at the University of Michigan College of Engineering, data from the Empathy and Care Questionnaire [4], student surveys and student reflection assignments, we consider the following questions:

- What lessons emerge from integrating storytelling into curricular and co-curricular engineering leadership initiatives?
- What are the primary advantages and limitations of different storytelling formats when considering implementation?
- How do storytelling initiatives impact student development in core leadership competencies, specifically communication, empathy, and creativity?

Storytelling takes many forms, including written, visual, digital, and oral methods. Among these, oral storytelling, which involves sharing stories out loud in real time, offers distinct opportunities for leadership development. Through oral storytelling, storytellers practice vulnerability, courage and creativity as they engage listeners and strive to communicate their message effectively. At the same time, listeners develop empathy by connecting with the emotions, perspectives, and experiences shared through the story. By participating in oral storytelling, both speakers and listeners build core skills that are essential for successful teamwork and leadership in engineering.

While our primary focus in this paper is on oral storytelling as a means of developing engineering leadership skills, written and visual/digital storytelling also offer unique advantages [5] that warrant consideration for engineering leadership development.

## Background

*“The art of craft of narration of stories in verse and/or prose, as performed or led by one person before a live audience; the stories narrated may be spoken, chanted or sung, with or without the musical, pictorial, and/or other accompaniment, and may be learned from oral, printed, or mechanically recorded sources.” [6]*

Storytelling has been defined in many different ways across a variety of disciplines and throughout history. Communication expert Johel Brown-Grant suggests, “At its core storytelling is the art of weaving narratives about incidents, events, or occurrences.” Evidence indicates that information structured in story form is received and retained more effectively [7] so a natural emergence of storytelling across continents and cultures has been demonstrated over time [8].

### *Modes of Storytelling*

Storytelling can be categorized into four distinct yet interconnected modes, each with its own defining features, while sharing overlapping elements:

- Oral - Oral storytelling uses the spoken word, typically through speeches, presentations and dialogue, fostering real-time audience engagement and immediate feedback while building a dynamic human connection. It allows the storyteller to adapt to audience reactions and has the potential to cultivate empathy as well as interpersonal and intercultural understanding [5].
- Written - Written storytelling, found in articles, emails, personal reflection and essays, communicates detailed information with precision. It promotes thoughtful organization of ideas, supports deeper reflection, and creates a permanent record that can be revisited over time.
- Visual - Visual storytelling uses images, graphics and animations to simplify complex ideas and enhance understanding. It supports creativity and communication skills while helping the audience understand the story in a vivid and immediate way [9].
- Digital - Digital storytelling, typically delivered via social media and websites, reaches wide audiences and incorporates text, visuals, and audio. It allows interactive, multimedia experiences and contributes to an accessible, engaging experience for diverse learning styles [5].

### *Competency Development*

The College of Engineering at the University of Michigan utilizes a leadership development framework, including a set of key professional competencies. (See Appendix A for competency definitions.) This framework draws from National Association of Colleges and Employers (NACE), National Academy of Engineering (NAE), the American Society for Engineering Education (ASEE), Accreditation Board for Engineering and Technology (ABET), along with

input from faculty, staff, students, alumni and employers [10-14]. Of the identified competencies, **communication** and **creativity** are the top competencies University of Michigan engineering students select to focus on developing [15], both of which can be developed through storytelling [16]. A strong case has been made for developing **empathy** among engineering leaders and engineering students more broadly, which is a key competency developed through storytelling [4]. One illustrative model is Story-Driven Learning (SDL), which provides a mechanism for understanding how storytelling supports competency development by generating outcomes across the areas of cognitive development, holistic development, and socio-emotional growth [17].

### *Empathy and Care Questionnaire (ECQ)*

The Empathy and Care Questionnaire (ECQ) is an instrument designed to measure perceptions of empathy and care, particularly within engineering practice [4]. It assesses how engineers view the role and importance of empathy and care in their individual and professional lives.

Development and validation of this instrument showed that empathy and care were widely valued in engineering, especially in relational aspects of the profession, and that appreciation for these qualities grew with work experience [4]. However, most respondents felt their college education did not enhance their empathy or care, suggesting a need for targeted pedagogy [4]. The Empathy and Care Questionnaire (ECQ) can be used to assess the value individuals place on empathy and care in both personal life and professional engineering practice [4].

### **Storytelling Approach & Methods**

In the following sections, we share five examples of incorporating storytelling into curricular and co-curricular leadership development efforts for engineering students. While each example is different in terms of style, scope and scale, there are commonalities in the intended learning goals between them. After describing the example, when applicable, we will provide information about the method we used to examine the impacts of the initiative, share results and offer discussion.

### **Engineering (ENGR) 499 - Design Your Engineering Future**

ENGR 499: Design Your Engineering Future is an advanced course in which senior-level engineering students harness storytelling to enhance their professional preparation and leadership skills. The curriculum centers on helping students translate their co-curricular engineering experiences into polished, competency-based narratives.

A distinctive pedagogical approach in ENGR 499 is structured storytelling with a professional lens. Early in the course, students identify meaningful moments from their academic journey and develop them into “interview stories” that demonstrate essential engineering competencies such

as teamwork, ethical reasoning, creativity, and resilience. These stories are practiced extensively, with feedback from peers, mentors, and instructors, culminating in a final oral presentation designed for a professional audience.

In this course, storytelling is explicitly positioned as a tool for professional development and job placement. Students learn to frame their experiences in ways that resonate with employers, directly addressing common interview prompts and showcasing leadership potential. This focus reflects research and industry input: candidates who narrate clear, relevant stories are better equipped to connect with interviewers and stand out in competitive job searches.

Through guided reflection and practice, students complete the course with a personal archive of interview-ready stories and a set of professional documents anchored in personal values and leadership competencies. ENGR 499 ensures that students are not only prepared to enter the workforce, but also equipped to articulate their unique value as future engineers.

### *Methods*

In Fall 2025, students enrolled in ENGR 499 were invited to participate in a pre-semester and post-semester survey during class time, consisting of questions from the ECQ [4] along with additional questions related to leadership. A total of 43 students participated; 43 responded to the pre-survey and 33 responded to the post-survey. Students also provided feedback through teaching evaluations, collected at the end of the semester anonymously.

Students indicated the importance of each construct (empathy and care) in two different contexts: as an individual and as an engineer.

**Table 1: Relevant items in the survey instrument**

| Context    | Construct | Survey Item                                                                                                                 | Response Scale     |
|------------|-----------|-----------------------------------------------------------------------------------------------------------------------------|--------------------|
| Individual | Empathy   | Rate how important empathy is FOR YOU as an INDIVIDUAL on a scale of 0–100 (0 = not at all important, 100 = very important) | 0–100 (importance) |
| Individual | Care      | Rate how important care is FOR YOU as an INDIVIDUAL on a scale of 0–100 (0 = not at all important, 100 = very important)    | 0–100 (importance) |
| Engineer   | Empathy   | Rate how important empathy is FOR YOU as an ENGINEER on a scale of 0–100 (0 = not at all important, 100 = very important)   | 0–100 (importance) |
| Engineer   | Care      | Rate how important care is FOR YOU as                                                                                       | 0–100 (importance) |

|  |  |                                                                                  |  |
|--|--|----------------------------------------------------------------------------------|--|
|  |  | an ENGINEER on a scale of 0–100 (0 = not at all important, 100 = very important) |  |
|--|--|----------------------------------------------------------------------------------|--|

### *Results & Discussion*

All four constructs increased in average importance from pre- to post-survey, with larger increases in the importance of empathy and care as an engineer (but not statistically significant) as compared to the personal context (increases of 5.2 for empathy and 4.9 for care, compared to 1.5 and 1.5 respectively).

**Table 2: Comparing pre- and post-ECQ survey results for students enrolled in ENGR 499.**

| Construct            | Pre  | Post | Change | P-Value |
|----------------------|------|------|--------|---------|
| Empathy (Individual) | 90   | 91.5 | +1.5   | 0.65    |
| Care (Individual)    | 91.1 | 92.6 | +1.5   | 0.55    |
| Empathy (Engineer)   | 83.9 | 89.1 | +5.2   | 0.14    |
| Care (Engineer)      | 85.3 | 90.2 | +4.9   | 0.18    |

While the changes are modest and not statistically significant, the consistent upward trend may suggest a possible relationship between storytelling-based curriculum and deeper reflection on these professional values.

Students rated empathy and care as individuals slightly higher than as engineers on both the pre- and post-surveys. The professional context (engineer) saw more robust percentage growth between the pre and post. This growth may suggest the course helps students better recognize the professional relevance of empathy and care as an engineer. The curriculum’s emphasis on “translating personal experiences into professional narratives” may be effective in emphasizing the importance of these constructs in engineering.

One limitation of this methodology is the lack of explanation of either “empathy” or “care” in the instrument, leaving the definition to the respondent’s interpretation. Additionally, the high scores in the pre-survey for all constructs may contribute to a ceiling effect, reducing the likelihood of statistically significant change for any constructs.

Although not formally measured, students’ overall satisfaction with this course appears high, based on teaching evaluations and course registration trends. Teaching evaluation responses consistently highlight the storytelling aspect of the course as a “strength of this course.”

### *Implementation Considerations*

A key advantage of the ENGR 499 model is that directly linking storytelling to students' professional goals (career development and job placement) increases buy-in and motivation. This approach is most effective in a full-semester course, where students have time for multiple cycles of reflection, drafting, practice, and feedback. A practical limitation is the reliance on mentors. While adding tremendous value, it is time-intensive to arrange connections with mentors and can constrain scalability.

### **Engineering (ENGR) 430 - Honors Seminar III**

ENGR 430: Honors Seminar III is a leadership development course that supports integrative learning for students in the final year of the College of Engineering Honors Program. It is the final course in a three-part series that is required for all engineering Honors students at the University of Michigan. Students integrate knowledge from previous educational experiences to develop lifelong learning skills and prepare to contribute to the fields of science and engineering. Students provide mentorship to lower-division students on professional development and their personal development plan. Topics include mentoring, professional development, ePortfolio development, courageous leadership, imposter phenomenon, career and graduate school preparation, integrative learning and generative listening/storytelling. The course concludes with a final reflective presentation.

In Fall 2025, we divided the class in half: 50% of the class engaged in a Generative Listening activity and the remaining 50% participated in a Story Exchange. While the course already provided students the opportunity to practice storytelling through Generative Listening, introducing the Story Exchange approach allowed us to explore whether a different format with the same story prompts might impact the development of empathy [18].

The story prompts provided were the same for both activities. In advance of the course meeting, students were asked to reflect on two prompts and subsequently select one for the activity. The provided prompts were:

1. Reflect on an experience in any context of your life when you felt particularly successful or proud of something you achieved.
2. Reflect on an experience in any context of your life when you felt particularly challenged or struggled to achieve something.

Generative Listening Activity - Generative listening is an activity where participants engage in deep, open-ended listening with one another to foster understanding and connection. In the classroom setting, students pair with a peer and focus on listening without interruption as their

partner shares a personal story. Instead of responding or offering solutions, the listener practices being fully present and identifies strengths and positive qualities demonstrated by their partner. This process promotes reflective listening and provides students with an opportunity to practice storytelling.

Story Exchange - Story Exchange is an activity where participants share personal stories with one another to foster empathy, understanding and perspective sharing. In the classroom setting, students each share a meaningful personal story with a partner, who listens attentively and subsequently retells the story to a small group from the perspective of the original storyteller. This process promotes reflective listening and provides students the opportunity to practice storytelling in a unique way. The process we utilized was created by Narrative4, a non-profit organization with the stated mission of “Equipping young people to harness the power of stories to drive change in their communities” [19].

**Table 3: Comparison of Generative Listening and Story Exchange Activities**

| Component         | Generative Listening                           | Story Exchange                                                  |
|-------------------|------------------------------------------------|-----------------------------------------------------------------|
| Primary Goal      | Deep listening for another person’s strengths  | Build empathy by sharing/retelling                              |
| Activity Format   | Listen without interrupting; reflect strengths | Share story, then retell partner’s story from their perspective |
| Group Size        | Pairs                                          | Pairs followed by small group                                   |
| Empathy Practice  | Listening and recognition                      | Perspective taking when retelling                               |
| Theoretical Basis | Four levels of Listening [18]                  | Narrative4 framework [19]                                       |

### *Methods*

In Fall 2025, students enrolled in ENGR 430 were invited to participate in a post-semester survey during class time, consisting of questions from the ECQ. In the post-survey, students indicated whether they had participated in the Generative Listening or Story Exchange activity earlier in the semester. A total of 21 students responded, of which 9 participated in the Generative Listening activity and 12 participated in the Story Exchange.

Students indicated the importance of each construct (empathy and care) in two different contexts: as an individual and as an engineer.

## *Results & Discussion*

All four constructs were higher for students participating in the Story Exchange activity compared to those in the Generative Listening activity. Students who participated in the Story Exchange demonstrated a statistically significant gain in the Individual Empathy construct. The engineering-context constructs (empathy and care as an engineer) and the individual construct of care were also higher for students who participated in the Story Exchange activity, although these differences were not statistically significant.

**Table 4: Comparison of ECQ results for students enrolled in ENGR 430 by activity**

| <b>Construct</b>     | <b>Generative Listening</b> | <b>Story Exchange</b> | <b>Difference</b> | <b>P-Value</b> |
|----------------------|-----------------------------|-----------------------|-------------------|----------------|
| Empathy (Individual) | 84.3*                       | 92.5*                 | +8.2              | 0.04           |
| Care (Individual)    | 80.2                        | 89.7                  | +9.5              | 0.10           |
| Empathy (Engineer)   | 80.3                        | 86.2                  | +5.9              | 0.49           |
| Care (Engineer)      | 75                          | 87.8                  | +12.8             | 0.12           |

\*signifies statistical significance at  $p=0.05$ .

Introduction of the Story Exchange activity in ENGR 430 led to statistically significant increases in individual empathy as measured by ECQ, as compared to the Generative Listening activity. The activity's unique element of retelling another's story from their perspective appears to impact students' conceptualization of the importance of individual empathy. Care as an Individual and Engineer and Empathy as an Engineer all trended upward, with Story Exchange leading to higher increases than Generative Listening. While not statistically significant, it may be worth exploring further the impact Story Exchange has on all constructs, including in the professional context.

## *Implementation Considerations*

Both the Generative Listening activity and the Story Exchange can be completed in a single class session or meeting. The Story Exchange is especially easy to adopt, requiring minimal training as the prompt and instructions are straightforward for participants to follow. While the Story Exchange Activity is effective when used alone, it could also be embedded within a longer interaction or leveraged to launch a deeper discussion on related topics, such as empathy. Generative Listening requires the instructor to have some level of previous experience with the topic, as it requires a detailed introduction so listeners clearly understand their role and expectations. Overall, both activities offer a low-time, low-resource opportunity to practice listening skills. One limitation is that without explicit links to engineering practice, gains may be

more evident in the personal context and may not translate to how students value empathy within the field of engineering.

### **Engineering (ENGR) 110 - Design Your Engineering Experience**

ENGR 110: Design Your Engineering Experience is an introductory course in which students explore the breadth of opportunities available to engineers in both their education and their career. The course is structured around three key themes: “What is Engineering?”, “Exploring Michigan and Michigan Engineering”, and “Self-Understanding”. Students explore these themes through self-directed, online modules accompanied by a weekly, in-class discussion (18-20 students per discussion section).

A core pedagogical approach within ENGR 110 is structured storytelling. Early on in the semester, students are asked to draw and share their individual pathways to Michigan Engineering, reflecting on motivations and experiences. Subsequently, upper-level peer mentors share their own trajectories through Michigan Engineering, providing both guidance and perspective. In addition, students develop and present action plans outlining either their intended summer plans or their five-year career aspirations. This vision activity functions as a type of future storytelling [20]. Storytelling in ENGR 110 supports the development of self-authorship [21] and establishes a foundation for key leadership competencies engineering students need to develop.

**Table 5: Engineering 110 Approach to Storytelling**

| # | Storytelling Type         | Description                                                                                             |
|---|---------------------------|---------------------------------------------------------------------------------------------------------|
| 1 | Origin Story              | Students draw their pathway to Michigan Engineering and share their "origin" story in a small group.    |
| 2 | Peer Mentor Journey       | Students listen as peer mentors share their pathway through Michigan Engineering.                       |
| 3 | Professional Perspectives | Students listen to Perspectives on Engineering talks, provided by alumni and engineering professionals. |
| 4 | Future Vision             | Students present their vision and action plan for future educational and co-curricular engagement.      |

As of Fall 2025, we have not specifically assessed the relationship between storytelling approaches used within ENGR 110 and the development of specific leadership competencies. However, the approach we use shares many similarities with story-driven learning pedagogy [17], which has demonstrated gains for students in three outcome areas: cognitive development, holistic development (including empathy and creativity) and socio-emotional growth.

## *Implementation Considerations*

Integrating storytelling into a first-year preparation course offers the advantage of reaching a broad student audience, since many students enroll for reasons unrelated to storytelling. A distinct strength of this format is the use of peer mentors, who can model effective storytelling and then provide guidance and feedback as students develop their own narratives. However, engaging peer mentors at scale can be time-consuming and resource-intensive, as mentors require training and preparation to facilitate storytelling effectively. Providing compensation for peer mentors may further constrain scalability.

### **Common Reading Experience: “There are stories everywhere”**

The Michigan Engineering Common Reading Experience is an experiential initiative designed to build and develop a sense of community among incoming first-year undergraduate students, broaden students’ thinking about the skills that are required for success as an engineer and model intellectual engagement. This program brings first-year engineering students together for discussion on a selected book, addressing topics such as ethics in engineering, identity, and the social impact of technology. The Common Reading Experience takes place during students’ first semester, with small group discussions facilitated by upper-division engineering students. In select years, the program culminates with a keynote address provided by the author or another speaker related to the text.

In past years, this program has featured books that foster critical reflection and dialogue in a variety of capacities. See Appendix B for the complete list of book selections. In Fall 2025, the selected book was *The Anthropocene Reviewed: Essays on a Human-Centered Planet* by John Green, which brought a deeper emphasis on the power of storytelling. This collection of short stories encourages students to notice stories in the world around them, reinforced by the program’s tagline for the year: “There are stories everywhere.”

During the facilitated discussions, students explored a subset of prompts specifically related to storytelling, including the following:

- “In *The Anthropocene Reviewed*, John Green uses storytelling to bring complex topics and everyday experiences to life. Why do you think storytelling is a powerful tool for communicating ideas or inspiring change? How might storytelling help engineers?”
- “Which story from the book resonates most with your own life experiences, and how might your personal journey inform innovative approaches in engineering?”

- “Green emphasizes the importance of community in various essays. How should leaders engage with and lead their communities? What role does storytelling play in this process?”

### *Methods*

Since the launch of the Common Reading Experience, annual program evaluation data have been systematically collected and analyzed. These evaluations offer valuable information regarding the student experience and shed light on how book selection and facilitated discussions impact first-year student perspectives. Nearly 100% of the approximately 1,500 first-year engineering students complete the evaluation each year.

Using two specific items on the program evaluations, we explored the following questions:

- To what extent did students notice or recognize the program’s focus on storytelling throughout the Common Reading Experience?
- Did the storytelling emphasis of the selected text influence the skills that students indicated an engineer would need?

### *Results & Discussion*

Reviewing the program evaluation responses from Fall 2025 uncovered that a small subset of students did appear to recognize the program’s focus on storytelling.

When responding to the program evaluation item “What do you think is the purpose of the Common Reading Experience?”, some respondents specifically mentioned storytelling or a shared story, which is a phenomenon we haven’t observed with previous book selections.

- *"The purpose of the Common Reading Experience was to give students the ability to discuss and share ideas under the premise of a shared story. I do believe the Common Reading Experience fulfilled this purpose, as I was able to connect with other students in my group with ideas relating to both the book, and our experiences attached to it."*
- *"The purpose was to get people to think of everyday objects and experiences in a new light. It certainly did get that point across through this story-telling."*

Additionally, we analyzed the survey item “Please list 3 skills/qualities that you think are important for an engineer.” in comparison to the same item on the program evaluation for the Fall 2024 book selection, which was *Bad Blood: Secrets and Lies in a Silicon Valley Startup* by John Carreyrou. While the 2025 book selection emphasized stories and the power of storytelling,

the 2024 book selection emphasized ethical decision-making and the consequences of technological innovation without accountability.

**Table 6: Comparison of skills/qualities first-year students perceived as important for an engineer, by book selection**

| Skill              | <i>Bad Blood</i> (2024) | <i>The Anthropocene Reviewed</i> (2025) |
|--------------------|-------------------------|-----------------------------------------|
| Storytelling       | 0%                      | 0%                                      |
| Communication      | 11.3%                   | 11.9%                                   |
| Creativity         | 6.2%                    | 8.6%                                    |
| Empathy/Empathetic | 13.7%                   | 12%                                     |
| Ethics/Integrity   | 10.6%                   | 4.9%                                    |

Choosing a book that emphasizes storytelling to a small degree does not seem to increase students' awareness of the importance of storytelling itself as a specific skill for engineers. This may be the result of students experiencing difficulty translating abstract themes into specific competencies with limited scaffolding. Additionally, because both books are written in narrative format, some elements of storytelling are present in both book selections, which might reduce the contrast observed between the selections. Despite not appearing to raise student awareness of storytelling competencies specifically, the book selection does appear to influence what skills students articulate are important for engineers. When comparing the 2024 and 2025 selections, we observed a higher proportion of ethics/integrity mentions for *Bad Blood* (10.6%) than for *The Anthropocene Reviewed* (4.9%), which is unsurprising given that ethics and ethical leadership are defining themes of *Bad Blood*. Mentions of communication, creativity and empathy remain relatively steady between the book selections.

### *Implementation Considerations*

Embedding storytelling into an existing, high-reach program such as a Common Reading Experience offers the advantage of reaching a large audience with minimal additional resources. With intentional book selection and a modest redesign of discussion questions, some students were able to identify the intended themes. However, this limited-scope approach did not consistently help students connect those themes to increased awareness of specific competencies. If the goal is to build competency awareness, both the text selection and guided questions should be designed to explicitly connect to those competencies.

Because Common Reading Experiences often require substantial planning and coordination, implementing this type of program solely to emphasize storytelling is not advisable. However, when an established program is already in place (or is being implemented for other intended purposes), leveraging the book selection and discussion design to highlight storytelling-related themes could be beneficial.

## **Story Lab**

Story Lab [22] is an innovative experiential program designed to cultivate leadership development among emerging business professionals within the Sanger Leadership Center at the University of Michigan. This program is open to students campus-wide and available as an optional program for engineering students. The structure consists of a skill-building retreat focusing on the art and architecture of storytelling, one-on-one coaching with professional storytelling coaches, and a public showcase or featured podcast episode in which students share their story.

All program skills are aligned to the Michigan Model of Leadership [23], with an emphasis on team communication, inclusion, curiosity, influence, and inspiration. Throughout the program, students learn to craft and share authentic stories, fostering deeper connections and modeling courageous leadership. They give and receive feedback from coaches and peers around the construction and delivery of a story. They learn to apply, and practice storytelling techniques to communicate with impact, and influence others to action. Additionally, they learn how practicing authenticity, engaging emotion, inviting curiosity, and focusing on key takeaways when constructing and delivering stories has the power to inspire teams and communities to activate and drive action.

While not formally assessed as of Fall 2025, Story Lab provides a substantially deeper dive into storytelling than any of the aforementioned examples. However, this depth comes with higher resource needs (professional coaching, retreat time, and production support), making it highly impactful for participants, but also potentially limiting scalability and access compared to lower-cost, course-embedded activities

## **Overall Results & Discussion**

Results from the implementation and examination of these five initiatives suggest that integrating storytelling activities into engineering education can help students build key leadership skills, most notably, empathy. The literature supports that storytelling also enhances communication and creativity [25]. Framing storytelling around career preparation led students to better recognize the value of empathy and care in professional contexts and also improved student buy-in. Activities such as Story Exchange and the Common Reading Experience promoted deeper reflection on human issues and community engagement. While changes were sometimes

modest, students consistently reported positive growth and greater appreciation for the human side of engineering. These findings highlight the potential for thoughtfully designed storytelling experiences to enrich engineering leadership development.

### *Storytelling in the age of AI*

As generative artificial intelligence (AI) continues to transform engineering and professional landscapes, the value of human storytelling is becoming even more essential. Authentic storytelling remains uniquely powerful in connecting people, inspiring innovation, and fostering trust [26]. Oral storytelling may rise in effectiveness, given the increasing ease of generating visual, digital, and written artifacts with AI tools. In the age of AI, thoughtful integration of storytelling into engineering leadership development may be necessary to help graduates distinguish themselves as communicators, creative problem-solvers, and empathetic leaders.

### *Additional Positive Outcomes of Storytelling*

Storytelling has powerful benefits that reach beyond developing empathy, communication, and creativity. Through storytelling, students gain self-authorship [21], reflect on their experiences, understand who they are, and define their own goals. Storytelling can also contribute to a sense of community and belonging. Additionally, storytelling supports wellness by creating space for students to express challenges, celebrate successes, and reduce feelings of isolation [27]. When educators include storytelling, they foster an environment where students feel understood, cared for, and part of a supportive community. This fosters well-being, confidence, and personal growth alongside academic achievement.

### *Limitations*

This practice paper primarily aims to showcase several examples of integrating storytelling into engineering leadership development rather than to present comprehensive research findings. This approach is limited by relatively small sample sizes, reliance on self-reported data and a lack of longitudinal analysis. Future work could address these gaps by involving larger and more diverse samples, utilizing more rigorous assessment tools, and conducting follow-up studies to better understand the ongoing influence of storytelling on professional growth and leadership competency development in engineering.

## **Conclusion**

Engineering leadership educators should consider making storytelling a regular part of their teaching and co-curricular programs. Storytelling helps students strengthen important skills like communication, creativity, and empathy, which are essential for success as engineers and leaders. To get the most benefit, educators might consider adding storytelling activities throughout the

undergraduate experience, providing framing to demonstrate that storytelling supports job search and career preparation, which increases student buy-in. Future work may include tracking students after graduation to show how storytelling shapes their careers and professional identity over time. Leveraging campus-wide programs can help emphasize the broader importance of storytelling, while exploring storytelling programs offered in other disciplines can bring in fresh approaches and diverse perspectives. By building more storytelling into engineering education and collaborating across campus, educators will better prepare students to lead, communicate, and make an impact in their field.

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## Appendix

### Appendix A: Competency Definitions and Dimensions

**COLLECTIVE IMPACT:** *Cultivating an environment that collectively develops a shared purpose and inspiring others to work toward it.*

**Dimensions:** Team Impact, Organizational Impact, Societal Impact

**COMMUNICATION:** *Ability to critically read, listen, reflect, and convey information effectively in a variety of media with diverse audiences with different needs and perspectives across a variety of settings and contexts.*

**Dimensions:** Listening, Presenting - Oral and Visual, Speaking - Small Group or Informal Settings, Writing

**CREATIVITY:** *Ability to generate ideas, processes, products that are both novel (unique, original, atypical, cutting-edge) and appropriate (relevant, practical, useful, applicable, fitting, effective).*

**Dimensions:** Applying Divergent and Convergent Thinking Processes, Innovation, Production of Novel Ideas, Production of Useful Ideas

**EMPATHY:** *Ability to understand, appreciate, value the perspective of someone else by reasoning from their premises, assumptions, or ideas.*

**Dimensions:** Cognitive Empathy, Emotional Empathy, Empathic Response

**ENTREPRENEURIAL MINDSET:** *Ability and intent to engage proactive, innovative strategies in various contexts to solve ambiguous problems.*

**Dimensions:** Entrepreneurial Intent, Entrepreneurial Skills, Intrapreneurship

**ETHICS:** *Fully engage stakeholders to recognize that actions and choices have consequences, and that one must act with integrity and trustworthiness.*

**Dimensions:** Ethical Behavior, Ethical Reasoning, Knowledge of Ethics

**GLOBAL/CULTURAL AWARENESS:** *Ability to acknowledge, practice, and articulate one's own cultural identity to better appreciate, adapt to, and interact with individuals from differing backgrounds, values, and cultures.*

**Dimensions:** Cultural Competence or Awareness, Diverse Workplace Competence or Awareness, Global Competence or Awareness

**GRIT/PERSISTENCE/RESILIENCE:** *Ability to persevere and maintain passion/commitment for achievement of long-term goals, despite setbacks, failure, and/or adversity.*

**Dimensions:** Navigating Hostile Workplace, Overcoming Setbacks, Perseverance for Long-Term Goals, Pivoting When Appropriate

**LIFELONG LEARNING:** *Ongoing desire and fundamental ability to recognize personal skills/knowledge deficits; seek out and acquire needed skills and knowledge; and continue to grow new interests, talents, and passions.*

**Dimensions:** Ability to Seek out Appropriate Sources to Learn on One's Own, Knowing When to Ask for Help, Self-Agency in Educational Choices

**RISK (Ability to Accept and Manage Risk):** *Ability to critically assess available information, take action despite uncertainty, manage outcomes, and learn from failure as well as from success.*

**Dimensions:** Being Proactive About Risk Associated with Engineering Work, Consideration of Risk v. Reward in Decision Making, Recognizing the Need to Take Risks

**SYSTEMS THINKING (Authentic Problem Solving):** *Ability to recognize and appreciate the complex structures and their interconnectedness which are embedded in a system while maintaining a view of the highest -level objective to be achieved.*

**Dimensions:** Ability to Break Down a System into Discrete Pieces and Put it Back Together in a Coherent Solution, Ability to Make Appropriate Estimates when Problem Solving, Consideration of the Multi-level Goals of the Project

**TEAMWORK:** *Working to define and achieve a shared goal by leveraging individuals with different perspectives, roles, responsibilities, and aptitudes to overcome and use conflict to their advantage to create a more robust solution.*

**Dimensions:** Ability to Work Across Disciplinary Differences, Recognition of and Commitment to a Common Purpose/Goal, Valuing the Development of Shared Rules, Norms, Structure

## Appendix B: Common Reading Experience Book Selections

| Year        | Title                                                                                                                  |
|-------------|------------------------------------------------------------------------------------------------------------------------|
| 2025        | <i>The Anthropocene Reviewed: Essays on a Human-Centered Planet</i> by John Green                                      |
| 2023 & 2024 | <i>Bad Blood: Secrets and Lies in a Silicon Valley Startup</i> by John Carreyrou                                       |
| 2021 & 2022 | <i>Born a Crime</i> by Trevor Noah                                                                                     |
| 2019 & 2020 | <i>Full Body Burden: Growing Up in the Nuclear Shadow of the Rocky Flats</i> by Kristen Iversen                        |
| 2017 & 2018 | <i>The Immortal Life of Henrietta Lacks</i> by Rebecca Skloot                                                          |
| 2016        | <i>Spare Parts: Four Undocumented Teenagers, One Ugly Robot, and the Battle for the American Dream</i> by Joshua Davis |
| 2014 & 2015 | <i>The Boy Who Harnessed the Wind</i> by William Kamkwamba and Bryan Mealer                                            |
| 2013        | <i>The Travels of a T-Shirt in the Global Economy</i> by Pietra Rivoli                                                 |