Technology and Engineering Leadership

ENG101 Engineering Professionalism

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One of the most significant changes in the future of leadership within engineering will be the need for leaders to possess a deep understanding of both technical and non-technical skills. Technical skills will remain critical, but leaders must also be adept at communication, collaboration, and innovation.

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Leadership in Engineering and Technology

- Technology: artifacts or devices—machines, tools, structure, knowledge, organizations and approaches
- Good nor bad?
- Engineers as leaders (managers, entrepreneurs, consultants, academics and government officials) for development and implementation of technology
- Mobilizing others so they can execute a set of individual and collective tasks
- Transformative vision, guidance, and support to overcome barriers
- Ability to create the conditions that enable others to thrive

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Morally Creative Leaders

- Leadership is an achievement: success in moving a group toward goals
- Moral leaders direct, motivate, organize, creatively manage, or in other ways move groups toward morally valuable goals
- Leaders may or may not exercise authority
- Individuals at all levels in an organizations demonstrate leadership
- Leadership vs headship?

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Leadership Characteristics

- A commitment to self-improvement
- Continuous cultivation of self-awareness
- Discipline and follow-through
- Dedication to the mission
- Trust and faith in endeavors

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The Importance of Engineering Leadership

- Leadership is critical to a company's success.
- According to Zippia, 69 percent of employees say they'd work harder if they felt their efforts were appreciated by organizational leadership.
- Seventy-nine percent who quit their position say they did so because of a lack of leadership.
- Leadership: An effective leader creates a vision and inspires others to follow it through.
- Leadership is people-focused and involves developing ideas. It's more of a quality than a role.
- Management: A manager guides individuals to accomplish recurring tasks.
- Management focuses on existing processes rather than innovation and encourages people to adhere to existing structures and systems
- Management and leadership are necessary for a company to succeed.
- Leadership qualities enhance management skills, so focus on developing both.

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How to become an engineering leader?

- Approximately 70 percent of leadership qualities are acquired through experience and education.
- Develop Complementary Skills
  - Problem-solving: Engineers constantly simplify complex problems and find effective solutions.
  - Attention to detail: Paying attention to small details can make the difference between an effective leader and an unsuccessful one. It allows engineering leaders to determine the practicality of a solution or identify a potential problem.
  - Humility: The best engineers want to learn from others and better themselves personally and professionally. The same can be said for leaders in the field. Humility and a willingness to learn can make all the difference in engineering leadership.
  - These skills can bolster your resume for leadership positions, so if you've developed them during your career, highlight them on job applications.

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Leadership Skills

- An ability to influence others
- A balance of transparency and privacy
- Encouragement of risk-taking and innovation
- A strong sense of ethics and integrity
- Decisive action
- A symmetry of hard truths and optimism

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Business Skills

Whether you're an engineer hoping for a management position or want to start your own company, there are several ways to obtain the skills needed for leadership positions.

The skills employers tend to value have shifted; while technical skills can help you enter highly specialized industries—such as engineering—business skills can take your career to the next level

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Business Skills….

Technical knowledge and expertise aren't the only skills needed for a successful engineering career—it also requires business skills beyond leadership, such as:

1. Communication: For engineering leaders to gain support for their initiatives, they often must simplify complex topics for others across their organizations.
2. Management essentials: Decision-making and strategy implementation require a thorough grasp of management essentials.
3. Problem-solving: Creative problem-solving is a vital business skill because it increases productivity and facilitates innovation.
4. Business operations: Since many management positions require budgeting, understanding different aspects of business operations, such as financial accounting, is critical.
5. Research and critical thinking: Technology is continuously advancing and disrupting industries. Engineering leaders must be alert for opportunities and validate their ideas.

"If an engineer graduating from college ascends from an entry-level position to CEO, with each promotion, they use less engineering skills and more business skills"

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Successful Engineering Leaders in History

Gustave Eiffel: The mastermind behind the iconic Eiffel Tower, Gustave Eiffel was a French civil engineer.

Charles Babbage: An English mechanical engineer, inventor, and mathematician, Babbage is famous for his work on the analytical engine, a precursor to modern computer

George Stephenson: The "Father of Railways," Stephenson was instrumental in building the first commercially operated railways across England and Europe

Elon Musk: A contemporary engineer, Musk has disrupted multiple industries. His work with SpaceX, Tesla, and other ventures has pushed the boundaries of technology and sustainability.

Satya Nadella: An Indian American engineer, Satya Nadella has had a remarkable journey. He graduated as an electrical engineer from the Manipal Institute of Technology in India and later pursued higher studies in the United States. Nadella joined Microsoft in 1992 and played a pivotal role in advocating for cloud computing. His vision and leadership led him to become Microsoft's CEO in 2014, where he continues to shape the tech industry

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References

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