ELEC4122 (Part B): Strategic Leadership
GSOE9510 (Part B): Leadership in Engineering

The Framework

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Faced by Graduate Technical Leaders

Reference: D. W. Hess, Leadership by Engineers and Scientists, Wiley, 2018

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Engineering Leadership: *Students*

✓ Engineering students have extensive education and training in technical fundamentals. As part of this education, they solve many technical problems using the skills and knowledge they have developed.

✓ Engineering students are given some exposure to working in teams as part of their degree, but there is virtually no education or meaningful insight into leadership skills;

✓ After graduation, engineers work almost always in teams that have a leadership structure. They use their skills to address technical problems but in addition, their work needs vision-generation, goal-setting, decision-making, and effective communication.

Learning Technical Fundamentals

Group Learning

Factors Affecting Decision Making

Engineering Leadership: *Team Leadership*

- ✓ Success in these activities and responsibilities begins with the leader.

- ✓ Leadership is considered a team activity, but the critical attribute is how leaders support their teams.

- ✓ To become a good leader who inspires others, it is important to develop the right engineering leadership skills.


Team Activity

5

Engineering Leadership: *Decision Making*

Decision Making

11.

- ✓ Performance in an engineering position and career requires detailed knowledge of the technical fundamentals, and the ability to apply that knowledge to solve problems. However, these capabilities on their own, are not enough for long-term, strategic career success.

- ✓ A lot of the day-to-day work for engineers involves interactions with individuals and groups within or outside their organisation, where goals and performance are discussed and business decisions are made.

- ✓ It is critical to develop leadership and decision-making skills, to communicate decisions and their implications clearly, and to ensure that tasks are performed in an ethical and professional manner.

- ✓ It is known that engineers are hired for their technical skills, but they are promoted for complementing these technical skills with leadership, management and people skills.

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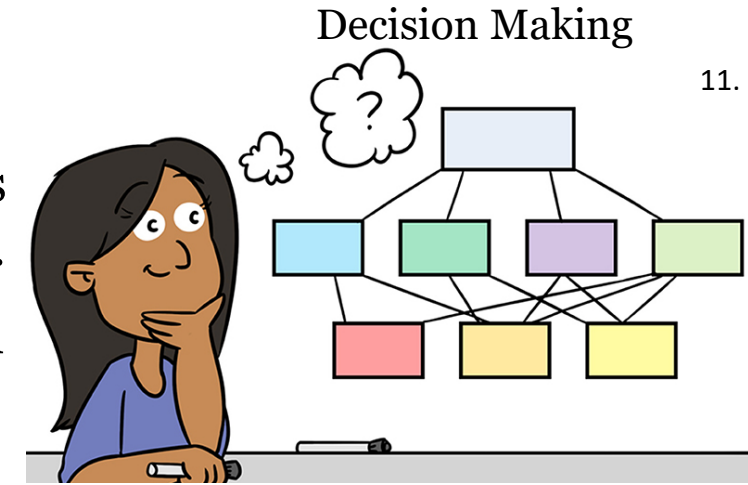
Design Thinking and Interaction

Engineering Leadership: *Soft Skills*

✓ Communication skills (speaking, writing, navigating other people's personalities) have been recognised as critical abilities for engineers. Many universities have addressed this by including elements of this in the engineering curricula.

✓ Engineering ethics has been similarly recognised as a key skill.

✓ Leadership and teamwork skills are important in structured group work, and become more important as an engineer moves along a career path and takes on greater responsibility.

✓ Some people are natural leaders, but most are not.

✓ There are many aspects of leadership that can be learnt to help engineers avoid mistakes, and succeed in career paths that require leadership skills.

13.

14.

Engineering Leadership: *Skills Development*

✓ In addition to having engineering competency, we need to develop student leaders who can:

1. establish and promote a vision,

2. build and run diverse and inclusive teams,

3. make timely and effective decisions,

4. communicate clearly,

5. ensure high performance levels, and

6. manage change and people's personalities.

Developing Student Leaders

✓ Individuals generally achieve the above six proficiencies by trial-and-error or observation after completion of their degree(s).

✓ Graduates, in their employment environment, may encounter many examples of leadership successes and failures. They analyse these situations either after their own initial success or failure or after observation of others displaying successful or unsuccessful attempts at these efforts;

✓ The starting point in dealing with many leadership situations is for the leader to understand themselves, and understand their strengths and weaknesses.

Engineering Leadership: *Examples*

✓ Technical leaders, for example, may encounter situations that they may not have come across before or may have received no training, and often have little awareness – they learn on the job:

1. A decision must be made regarding the purchase of a new electronic equipment for your department. The department members are split regarding which manufacturer and model should be ordered, and the discussions have become extremely heated and emotional. As a team leader, how do you make this decision, and how do you deal with the individuals whose recommendation you did not take?

16.

Challenging Behaviour

2. One of your team members is rude, and disruptive at team meetings. Other team members avoid this individual and refuse to interact. Due to the specific technical background and expertise, the individual is critical to the success of many projects. How do you handle this situation?

17.

Unproductive meeting

Engineering Leadership

- ✓ Engineering students are taught how to address problems, while increasing their understanding of the field, by solving numerous problems in tutorials or exams.

- ✓ The methods of problem solving can then be used to take on new problems that they may not have come across before.

- ✓ After graduation, students are expected to use their problem-solving skills to address more open-ended problems with a sufficient number of boundary conditions that an exact solution is unlikely or impossible - an "approximate or optimum" solution is needed, as experienced in product design problems.

- ✓ In this course we will provide you with open-ended problems focused on technical and nontechnical situations.

- ✓ By offering examples of dilemmas in technical leadership, along with selected analyses of possible ways to address or consider such issues, aspiring leaders can build awareness and develop methods to address future variations on these themes or new situations.

Engineering Leadership: *How does this course help?*

- ✓ Team leadership involves inclusivity, co-operation, synergy, and creativity within an extremely diverse group of individuals.

- ✓ Although formal degree programs focus mostly on technical skills, graduates are expected to have the appropriate "soft, professional, or people skills" to successfully lead a team or organisation.

- ✓ Many of the limitations and frustrations generally experienced by new leaders are related to the difficulties in inspiring, influencing, and guiding team members to decisions that move projects forward.

- ✓ This course helps prepare students and early career engineers for leadership roles.

18.

OPPORTUNITIES

LEADERSHIP GAP

GRADUATES

YOUNG ENGINEERS CAN CREATE

THE WORLD WE WANT

19.

Developing Your Leadership Skills

Examples of leadership skills that make an effective leader include:

- Strategic thinking skills
- Creativity
- Patience, Positivity
- Empathy, Active listening
- Reliability, Dependability
- Effective feedback
- Time management
- Team building
- Flexibility
- Risk-taking
- Ability to build trust
- Communication skills
- Good management skills
- Persuasion skills
- Taking responsibility
- Decision making
- Motivating and inspiring

- Delegating
- Emotional intelligence
- Honesty and integrity
- Respectfulness
- Self awareness and understanding of unconscious bias
- Commitment to inclusion, diversity and equity
- Ability to navigate in uncertainty
- Ability to manage other people's personalities

Where the magic happens

Your comfort zone

Summary:

✓ Engineering Leadership: Students

✓ Team leadership

✓ Decision Making

✓ Soft Skills

✓ Skills Development

✓ Engineering Leadership Examples

✓ Developing Your Leadership Skills

Short videos:

1. How To Be A Leader - The 7 Great Leadership Traits
https://www.youtube.com/watch?v=2lEp4TVpxgA

2. Leadership skills - training videos for students
https://www.youtube.com/watch?v=F7qVUf6igvM

3. Seven Essential Qualities of All Great Leaders
https://www.youtube.com/watch?v=eG16EmA2Fe0

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Chapter 1: Two Examples of Routine Problems Faced by Graduate Technical Leaders

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Leadership Dilemma: Example 1

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Leadership Dilemma: *Example 1*

Example 1

1. As a result of a team leader retirement, you have been given your first leadership/managerial position for a group of engineers who have been working together successfully and productively for more than 10 years.

   During the first few months of this new assignment, the attitude of a number of the team members appears to be one of distrust for you and your leadership style.

   It is apparent that the previously smooth-running operation is deteriorating, and you have been asked by your boss if there is a problem.

   How do you respond to your boss and how do you deal with the difficult interactions with your team members?

   Note: *You will gain the most insight and understanding from these examples if you take a few minutes to think carefully about how you might handle this situation prior to looking at the suggested solutions (there is no single answer, but there are multiple paths to follow)*

- First, an unbiased assessment (360° review) of your leadership style and current team directions is needed.

- A detailed self-evaluation on how you began this team leadership effort, and whether you gave the impression that you were going to immediately implement changes in culture, priorities, or rewards should be performed.

- In addition, you should request **feedback**, and ask questions concerning your attitude and actions, as you began this position from a trusted mentor or someone else outside the team.

- If you feel that one of the team members would be willing speak with you frankly one-on-one and address your questions so that you can gain insight into the impressions you have given the group, this will be very useful.
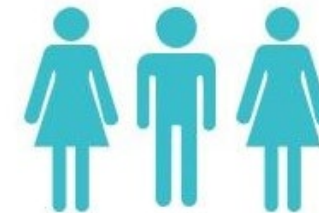
Leadership Style

Democratic

Leader

What do you think
we should do?

Team
Members

20.

Leadership Dilemma: Example 1 (Suggested Answer)

- You also need to determine if your behaviour during team or individual meetings would have given the impression that you were considering alternative ways of viewing the tasks your team undertakes without taking their input, and if you took an **authoritarian** approach to leading.

- You should also consider the possibility that some (or all) members of the team are resistant to change (even if it is for the better) and they have not yet decided if they can trust you or if you have established credibility with them.

- An additional possibility is that one or more of the team members felt that they should have been selected as group leader; rather, an individual outside the team (you) was selected.

Leadership Style

Autocratic

Leader

Do This!

Team Members

20.

- With this information, you can decide if you have caused the **dysfunction** within the team by your actions, if you have not yet proved that you deserve their trust, or if one or more members feel disappointed by your appointment.

- This conclusion will allow you to plan how to proceed.

- If you have caused the dysfunction, then you need to acknowledge and apologise to the team and indicate how you will rectify the situation.

- If you have not yet established trust, then you will have to show by your actions both on who you are and that you are true to the value/belief system that you claim to follow – actions speak louder than words. This may take some time, so patience is necessary.

21.

22.

A dysfunctional Team

- If you were selected for the position when others feel that they were more qualified or appropriate, then you will need to prove by your actions and attitude that you are qualified and are a team player in all that you do.

- You should share your thoughts about what you believe is the problem with your boss and indicate how you will approach a resolution.

- You will then receive additional input and suggestions from your boss to be factored into how you proceed.

23.

24.

25.

Consulting with the Boss

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Leadership Dilemma: Example 2

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Example 2

2. As a result of your efforts to address issues within your new team, the team members have once again begun functioning effectively and efficiently.

   Due to a mistake in assessing the number of new technical personnel needed, an additional engineer was hired and has been assigned to your team. Alex is a very impressive new graduate from a highly ranked Engineering Faculty.

   However, you quickly observe that whenever Alex asks a question or offers an opposing opinion in team meetings, his remarks create rude comments from several of the members.

   The normally collegial group seems to be polarising into two segments, as a result of this behaviour.

   How do you regain group collegiality and professionalism?

   Note: *There is no single answer, but there are multiple paths to follow.*

- Since there are some team members who appear to interact well with Alex (at least one segment of the team behaves professionally), you should speak with one or more of them to get their opinion of what they observe is taking place in team meetings, and why.

- As the leader, you need to assess from your own observation of behaviour whether Alex is giving the impression that he is talking down to the team, with his questions/remarks.

- This may be due to his tone of voice, body language, or attitude.

- In such cases, you need to speak with Alex one-on-one to let him know how he is coming across to the team. Ask questions that help him find ways that he can display more appropriate behaviour.

26.

Your talk was great!

27.

One-on-one meeting

- You can then also suggest ways that he can be viewed as more collegial and flexible. (Of course, this assumes that he is not aware of the impression he is giving).

- If he is simply arrogant, then you need to indicate what effect he is having on the morale and collegiality and why it is important for him to develop positive interactions with other team members, to ensure productivity and thus meet team goals/vision.

- You should monitor his progress to confirm that he is committed to change and that his efforts are effective.
  - If he is not willing to work towards that goal, then you may need to inform him that you will not tolerate such behaviour within your team; consequences need to be stated in this case.

Assign Task

Continuous Mentorship

Receive Result

Supportive leader

Employee

28.

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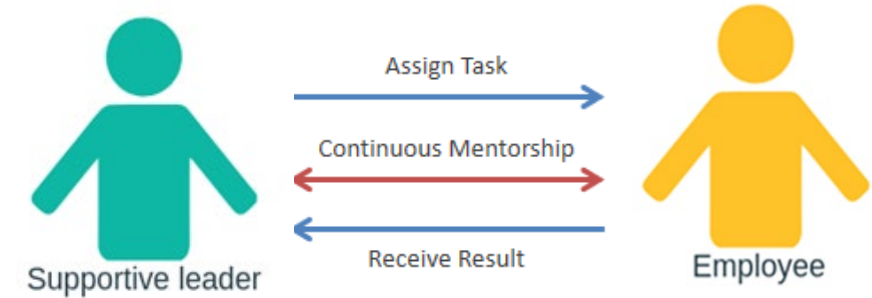
Supportive Leadership

Leadership Dilemma: Example 2 (Suggested Answer)

- If neither you nor other team members perceive problems with Alex's behaviour, then you need to discuss the response that is occurring with the team member (or members) who are responding to him rudely.

- Ask why this type of response has arisen and what he/she intends to accomplish by such behaviour.

- This will allow an assessment of the inappropriate behaviour, and the development of a plan to address these issues.

- Both Alex and other team members may need behaviour modification and this will require that they are motivated to change and willing to develop a plan to correct their actions.

- When all team members are aware that you are making a sincere effort to sort out the differences, you may get assistance from others to improve the situation.

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