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Engineering Leadership Programs in Colleges and Universities: A Focus on Morality

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Abstract

Engineering programs at the college and university level have increased their focus on engineering leadership programs over the last decade. The education has focused primarily on skill-based subjects such as organizing, effective communication, and team-building. There is evidence that supports the ability to improve leadership ability by including material related to moral disengagement and moral identity in any leadership development program. This paper describes what is being done today and evidence to support changes in current programs.

Introduction

Engineering programs at colleges and universities have traditionally focused on the technical competencies that are required to become a proficient engineer. Engineers learn the engineering basics as they progress through their education. Classes include thermodynamics, heat transfer, digital electronics, and various forms of calculus. While these core courses are needed, there is increased focus on leadership education in engineering programs. The ability to lead in an engineering environment is a unique skill that requires foundational knowledge and practical experience.

Engineering programs have responded to this need and many have begun to focus on leadership development programs. These schools work to improve leadership skills such as effective communication, problem-solving, and organization. These are necessary elements of leadership, however, the gap in knowledge and experience goes much deeper. Because the ramifications of unethical decisions are ones that can damage any organization, a leader's moral identity must be grounded in a way that allows for ethical decision-making for the organization.

This paper looks at the current efforts to develop engineers that can lead teams and organizations to achieve an organization's objectives. The findings indicate a need for skill-based competencies as well as a need to focus on morality.

Engineering Leadership Today: What Exists at the College and University Level

Understanding the need for leadership development for engineering students seems to make sense, but there has been an overall lack of success in doing this. Working to understand the leadership attributes of current students across various schools to establish a baseline would help clarify the need. Today, there is not a method for doing this, so each institution manages its need assessment independently. There are also no empirical studies that target leadership attributes of college engineering students. There is a need to develop

some formalized method to measure leadership as it pertains to engineering students (Cox, Cekic, & Adams, 2010).

Engineering leadership programs at the university level are in place at many schools and the trend will continue. These programs focus on various areas of leadership in hopes of transforming a young engineer into someone who can think in a different way. Crumpton-Young et al. (2010) defines engineering leadership as "the ability to lead a group of engineers and technical personnel responsible for creating, designing, implementing, and evaluating products, systems, or services" (p. 10). A survey was conducted to obtain feedback from both engineering students and professionals on various topics concerning engineering leadership. The survey consisted of questions related to demographics of the group, including education level and position title. The professionals that were surveyed consisted of 264 participants that were diverse in both race and ethnicity. Thirty percent were males and 70% were females, and all held at least a bachelor's degree in engineering (Crumpton-Young et al., 2010). This group identified the most useful skills related to leadership to be team building, personal development, continual learning, and communication skills. They also rated the leadership characteristics they possess. The top 3 items for the group were being honorable, credible, and determined. Skills they rated the lowest included being a visionary and their ability to network. There are no direct comments in regard to ethics or morality that were rated near the top of the list.

Engineers also have a number of barriers when they are studying at the university level that inhibit their ability to learn more about leadership. This would include the rigidness of the engineering curriculum with little room for flexibility in the curriculum, and limited faculty that have formal leadership training. Structural change to the overall engineering program would help facilitate opportunities for leadership learning. Formal leadership development that is incorporated into engineering education programs is needed. This can be a difficult task as the existing curriculum is very time constrained. Just adding more courses at a time when the cost of education continues to rise is not the answer (Cox et al., 2010).

Opportunities to improve leadership skills exist today. The senior design project that is part of most engineering programs can be a time to focus on leadership. There are opportunities to build teamwork, communication, and presentation skills. Internships and other co-op programs also provide an opportunity for leadership skills to be observed and practiced (Cox et al., 2010). Student organizations can also provide leadership opportunities while in college. There are opportunities to lead sporting teams, student government, or fraternities. There are also opportunities to lead while volunteering on campus or in the local community. Despite the availability of leadership opportunities, there is no open discussion in regard to morals and ethical decision-making.

Moral Identity and Moral Disengagement: Incorporation into Leadership Programs Moral Identity

Ethical decision-making is a skill that requires focus for engineering managers. When decisions are made that are unethical it can have a severe impact on employees, the community, and the environment. Companies have an obligation to uphold high ethical standards. Engineering leaders must work to improve their ability to make ethical decisions. Engineering programs have not taken responsibility to teach ethical decision-making, due to the need to teach foundational engineering courses in the required amount of time to obtain a degree. While there is focus on some skills such as presenting material and

communicating, leadership development should also focus on the nurturing of moral identity. Improvements in this area will allow for more effective leadership and ethical decision-making. Moral identity has been well researched and is a construct rooted in moral psychology (Gu & Neesham, 2014).

The majority of ethics education has been traditionally rule-based. Examples are provided or worked through to understand what would be the best option in a particular scenario. This type of learning provides value and helps learners understand situations and normally references company codes of ethics and other professional standards. It is taught as moral philosophy that is based on principles. Because basic moral values are ones that are formed over long periods of time, this type of learning does not change the ethical attitudes of students (Gu & Neesham, 2014). Even with this learning, a gap also remains in the ability of the leader to transfer these general rules to a particular situation. This is due to the fact that either the rule or particular context are not aligned with the life experiences of that leader (Nyberg, 2007).

Moral Disengagement
A leader's ability to make decisions that are in the best interest of the organization takes an understanding of the situation as well as an understanding of the cultural norms and objectives of that organization. In an engineering environment making decisions that are based on data with clear communication impacts safety and human life. There are pressures when working on projects to cut corners to improve profitability and timelines (Starrett, 2013). The result could be product failure impacting the safety and well-being of others. An engineering leader will need to maintain their own self-sanctions. The moral conduct of the leader is in part self-regulated by the experiences of that leader throughout their life, but is also influenced by the environment and the situation (Bandura, 1999). There is selective activation and deactivation of personal self-sanctions by the same person under different circumstances. The following explains various types of moral disengagement and how they can influence the decisions a leader makes (Bandura, 1999).

Moral justification. Leaders sometime face situations when a business decision that appears to be in the best interest of the organization is not in the best interest of the employee. This causes leaders to look for ways to preserve their view of themselves while inflicting hardship on others. Moral justification for this behavior is made acceptable by portraying it as serving higher-level moral purposes (Bandura, 1999).

Euphemistic labeling. The language used in an organization also helps to morally disengage individuals. Euphemistic labeling helps situations take on a much different appearance. It is often used to make harmful conduct appear acceptable in an effort to reduce personal responsibility. Layoffs are referred to as "reductions in force" or a "career alternative enhancement."

Advantageous comparison. This method of disengagement uses comparison to make harmful conduct seem appropriate. By comparing a leadership action with something that appears to be worse, it helps to make the action seem more acceptable. Cognitive restructuring of business conduct that negatively impacts others through moral justification, sanitizing language, and advantageous comparisons is a powerful psychological mechanism for disengaging moral control. Engineering leaders need to identify these situations and understand how it influences decision-making. Morally-questionable behaviors regardless if

they are institutional, organizational or individual need to be looked at through a lens that includes a view of humanity (Bandura, 1999).

Conclusion

The existing work that from Cox, Cekic, and Adams (2010), discusses a number of ways to incorporate leadership into existing engineering programs. There is also discussion that focuses on the difficulty of adding any more curriculum to the existing schedule, none of which includes the addition or substitution of material related to morals or ethics. Crumpton-Young (2010), stresses the need for leadership focused curriculum in engineering programs but fails to mention any of the findings related to the inability to add any more material to an already full schedule. This area of difference should be explored with further research and should include material focused on morals and ethics. There is a clear need for leadership development in an engineering discipline. The time constraints of the program make additional courses difficult. Opportunities outside of the normal classroom are a possibility. Any opportunity to enhance leadership ability should include leadership that focuses on moral development as one of the pillars of success.

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Russ Carfagno is a director at Johnson Controls, an ASHRAE member and LEED AP. His focus is on operations, commercial products, and control systems. Russ is also a naval

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