

Southern Illinois University Carbondale

OpenSIUC

---

Honors Theses

University Honors Program

---

5-11-2020

## PREVALENT TECHNICAL LEADERSHIP STYLES AND THE IMPACT ON EARLY ENGINEERING CAREERS

Connor Eigelberger  
connor.eigelberger@siu.edu

Follow this and additional works at: [https://opensiuc.lib.siu.edu/uhp\\_theses](https://opensiuc.lib.siu.edu/uhp_theses)

---

### Recommended Citation

Eigelberger, Connor, "PREVALENT TECHNICAL LEADERSHIP STYLES AND THE IMPACT ON EARLY ENGINEERING CAREERS" (2020). *Honors Theses*. 466.  
[https://opensiuc.lib.siu.edu/uhp\\_theses/466](https://opensiuc.lib.siu.edu/uhp_theses/466)

This Dissertation/Thesis is brought to you for free and open access by the University Honors Program at OpenSIUC. It has been accepted for inclusion in Honors Theses by an authorized administrator of OpenSIUC. For more information, please contact [opensiuc@lib.siu.edu](mailto:opensiuc@lib.siu.edu).

# PREVALENT TECHNICAL LEADERSHIP STYLES AND THE IMPACT ON EARLY ENGINEERING CAREERS

**Connor Eigelberger**

A thesis submitted to the University Honors Program in partial fulfillment of the requirements for the Honors Certificate with Thesis

Approved by

Leadership Development Program Director, Dr. Bruce DeRuntz, CQE  
Department of Engineering Technology, Southern Illinois University  
Carbondale

May 11<sup>th</sup>, 2020

## Contents

Abstract.....	3
Introduction .....	4
Purpose .....	5
Research Questions .....	5
Background .....	6
Company 1 Un-Tapped .....	8
Question 1: ‘What is the dominant leadership style at Company 1, one of the world’s largest manufacturers?’ .....	8
Company 1 .....	8
Answer 1: .....	10
Past Experiences with Leadership.....	11
Question 2: ‘What is the dominant leadership style in the broader Engineering Sector?’ .....	11
Company 2 .....	11
Company 3 .....	13
Answer 2: .....	16
Table 1: Leadership Styles Usage Frequency .....	16
Figure 1: Number of Leaders Using Each Style .....	16
Figure 2: Number of Companies Using Each Style .....	17
Idealistic Leadership in Engineering .....	18
Question 3: ‘What is the dominant leadership style entry-level engineers should know in order to be successful?’ .....	18
Answer 3: .....	19
Figure 3: Percent of Leaders Using Each Style .....	20
Limitations.....	20
Further Research.....	20
Conclusion.....	21
Acknowledgements.....	22
Biographical Summary .....	22
Works Cited.....	23
References: .....	24

## Abstract

This study explores the question of ‘what is the most prevalent leadership style found in industry’, from an engineering student’s internship experiences. Over the course of a Mechanical Engineering student’s four years of internships, they recorded their observation to three questions: ‘What is the dominant leadership style at the Anheuser-Busch InBev Jacksonville Brewery?’, ‘What is the dominant leadership style in the broader engineering sector?’ and lastly, ‘What is the dominant leadership style entry-level engineers should know in order to be successful?’. It reflects on their personal experiences within the engineering industry and suggests an ideal leadership style which can be utilized by an entry-level engineer or a similar technical individual. The works of Bernard (2012), Paul, Robin & Falls (2015) were used to define both leadership and success to form a base for which to build substantial claims as to which techniques of leadership can lead to success for an entry-level engineer. Further, works from Scott, Daniel & Arthur (2017), Hartmann (2017), and Knight (2012) were used to build off their research on the correlations between leadership skills taught in college and the resulting success beyond the classroom. Leadership styles are ranked in order of their utilization in the industry and corresponding value to entry-level engineers. They are: Pacesetter, Authoritative, Democratic, Coaching, and Delegating. The study concludes with suggesting a correlation between knowledge in leadership and both the subjective and objective success of entry-level engineers. Ideally every engineer should be taught a multitude of techniques and it recommends that all engineers strive to learn as many leadership styles as they can whether they intend to hold a position or leadership or not.

## Introduction

Leadership: a skill just like any other which can be innately given or learned through the trials and tribulations of life, has always fascinated me. Like a lot of people, I look up to leaders such as Elon Musk or Bill Gates, who are at the center of attention with almost anything they do. Specifically, within engineering, where they are constantly innovating and pushing the limits. Due to this, there is ample research on their backgrounds and upbringing. Everyone searches for the commonalities as to how they got where they are. Rather, I believe we should take a different route to learning from these technical leaders. One where we study their current lifestyles. The daily ins and outs, and routines in which they employ their favorite leadership styles. Whether it is leading their companies, or simply building relationships with their friends and family I believe they all have points from which we can learn. With the current necessity for technical leaders, learning from the leaders of today might be our best shot. And this is exactly what I plan to delve into with this Thesis.

If you research leadership in engineering, you will likely come across myriads of examples that explain the lack of leadership training engineers undergo in their undergraduate studies. Research proves that this is a huge area where the industry believes our educational system is lacking (Knight). There are even studies which point out the leadership terms that companies put into their job descriptions when looking for entry-level hires and yet companies still struggle to find these clearly defined traits (Hartmann). There are many ideas as to how to fix this, however almost all of them call for further research or trials to achieve this goal.

## Purpose

Rather than simply look at numbers or provide more studies on what is missing, I intend to use my experience and current status as an engineering student who has had multiple internships and is seeking full time employment to look at this from a different angle. My relationship to this issue is quite direct, therefore, I think learning from those I have worked with and those who are known to do it best will be crucial. Combining that with my current enrollment status, I find that I am looking to answer these questions both for myself and those who follow in my footsteps as I progress forward in my career.

## Research Questions

The goal of this Thesis is to delve into the three questions of:

1. 'What is the dominant leadership style at Company 1, one of the worlds largest manufacturers?'
2. 'What is the dominant leadership style in the broader engineering sector?'
3. 'What is the dominant leadership style entry-level engineers should know in order to be successful?'

Thus, I will further determine which leadership styles work best specifically in the engineering sector and how that can help an entry level engineer; as well as, look at other aspects of actions leaders take day to day to lead the most effective teams. Now you might ask, 'what background do I have to recognize what leadership styles one is using'? That will be crucial in proving why I am qualified to write this document and to show how I intend to

present leadership as it was taught to me. As a measure of privacy, you will notice I have removed individual names in favor of generic labels.

## Background

For me, this research began before I even entered college, but for the purpose of brevity, I will start with my second year of college. I have been a member of the Leadership Development Program (LDP) for 2 years now and that has taught me successful building blocks to becoming a leader which I can use now and later down the road as I progress in my career. In the LDP they teach the principles of leadership-- one of their main focuses is that of CLC, or the Collegiate Leadership Competition. The CLC divides leadership into 6 styles or techniques which are listed below (in no order of importance):

1. Share your vision is seen as the authoritative style, is defined as leading with a clear description for the path ahead or all the knowledge needed to succeed.
2. Teach and coach, also known as coaching describes the process a leader uses to pass knowledge and information on to their team. Although time consuming, this builds the team for the long run and can produce future leaders.
3. Yell, tell and the hard sell, the coercive leadership style takes place when the leader pushes the group hard to do the task their way, ensuring the group complies with the direction.
4. Listen and engage others or the democratic leadership style involves the leader seeking wisdom and knowledge from the group and using this input to build ownership moving forward.
5. Energize and push, commonly known as pacesetting is highly defined by time constraints or defined results. The leader may need to "raise the heat" as they push their teams work to the next level.

6. Simply delegate or delegating implies giving each member of the team a set of tasks. This is great to allow team members to do tasks in their own manner and accomplish more with less time. (Allen)

These styles will be important in reading this thesis as I will be referencing them quite often. In addition to what I have learned in the LDP, I have been a manager for the past 6 months with Company 1. This has given me an inside view as to how the largest brewery in the world operates successfully, and why it consistently hires engineers. On a smaller scale, this put me in touch with many of the leaders of Company 1 and allowed me to learn daily from them, paying close attention to their leadership styles over the course of my 6 months. While 6 months may be a seemingly short period, I also have prior experience with other companies of various scales and locations. Before the 6-month co-op with Company 1, I was with Company 2, which is a medium scale mechanical contractor out of St. Louis, Missouri. And even before that I worked for a small architecture firm in Aspen, Colorado known as Company 3. I have also read leadership, self-help, and career development books, written by those who have found what success means for them and how they can share it with others. Culminating these ideas, this thesis provides both an overview of my insight and a logical wrap up to those looking for a successful career as a leader in the engineering workforce. This document covers many aspects of what it means to be a leader in a technical field and the things I have found that leaders do which makes them highly influential and successful in their career. Thus, providing a better concept of what a successful leader in engineering does and how they keep doing it on a daily basis. It will show what skills engineers like me need to learn in order to excel when given the opportunity to lead.

## Company 1 Un-Tapped

Question 1: 'What is the dominant leadership style at Company 1, one of the world's largest manufacturers?'

As previously stated, I worked for Company 1 in Jacksonville, Florida from May through December 2019. Overall, I learned a lot about what it takes to run one of the largest breweries in the world. Through my 6-month Co-op I learned what the leaders within the Jacksonville, Florida brewery and the North American Zone do day-to-day to enable each part of the company to remain successful. The best way I found to document this was by filling out a survey accounting for the different leadership styles and effectiveness of all the leaders I encountered at Company 1 which I have summarized below:

### Company 1

Person A- The Assistant Manager in Jacksonville. An extreme leader by the style of "yell, tell, and the hard sell" but nonetheless a great leader. From the day I met Person A I knew exactly what kind of leader I had. Person A is the kind of boss who lives with his employees constantly in fear of his presence. There is no doubt this is very much the coercive leadership style. In many ways this gets results, people do act but to me there is a limit to this type of extreme leadership. It puts a huge toll on the relationships and moral of the team. I overheard so many conversations about how much employees must do to keep from getting their "A\*\* chewed". While this does work in certain situations, and it did work well with the union environment at Company 1, it was quite overwhelming for many of the other managers under Person A. It seemed as if all they

wanted was a sense of accomplishment, which was impossible when they always felt as though they were in a losing battle.

Person B- The General Manager was often the one to bring the most energy to the room. When he was present everyone knew we were in for a good time with tons of new information from the corporate office. Most GM's would choose to teach or share their vision.

Person B instead relied on the technique of 'energize and push'. We had no time to wait before acting as we were already one of the top breweries in the world and it was our responsibility to keep that up. Rather, we had to continue to push to stay ahead. This led to a very fast paced and exciting day to day work environment. I would with no hesitation say that Person B used pacesetting almost daily in his meetings which put into place deadlines and rewards along the way to keep us motivated.

Person C- My team's Manager was a great mentor for me. He was also one of the best leaders in the brewery. He consistently focused on small wins in a brewery where it was all too easy to let the problems ruin your week. Person C would often be using multiple leadership styles which made him that much more effective. But as he was a father with a large family presence in his life he always fell back on 'teaching and coaching'. Knowing that Company 1 was pushing us to staff less and less managers he knew we had to make the employees self-sufficient which required hours of teaching. But he was also very big on the 'energize and push' technique—for example, if we were having a long week, he would reward us with simple things like leaving early on a Friday or a luncheon's if possible. And if we just needed energy, he was quick to shoot out a message congratulating us on what a great job we had done or how close we were to

completing the current task. Many times, this was revolving around the weekly taste score our beer received so this was cool to watch as I was directly impacted with each score report.

Answer 1: 'What is the dominant leadership style at Company 1, one of the world's largest manufacturers?'

Summing up the 3 leaders above, I get a total of 2 leaders who use the pacesetting style, 1 leader who uses coercive, and 1 leader who used the coaching style. And while this may provide a solid snapshot of the leadership at Jacksonville, it is important to realize this is hardly the total of all the leadership styles used even just at Company 1. In my time with Company 1, I saw an overall transition between two leadership styles. Their day to day operations runs frantically on a 'energize and push' or pacesetting style which can get tiring. I could see many of my coworkers burning out or simply turning into managers as this made it easier for each separate manager to get their own jobs done, but this deeply hurt the team overall. When you continuously push with no end in sight the weeks get long, and it can feel like you are never winning. But towards the end of my time at Company 1 they were implementing a 'teach and coach' style of leading as they were realizing the modern world uses less people and more computerized automation. This was influential to see as it required every member of the team to learn in a 'the team is only as strong as its weakest link' manner. We even had a learning program which gave each team member a rating for each skill they acquired. The individual ratings ranged anywhere from 1-5 and each level of the rating required new training and more tests to pass. This allowed us to systematically see which operators were best at which jobs and

easily fill positions, if say someone gets sick and needs coverage. For this reason, I would say the overall theme of leadership at Company 1 was to 'teach and coach'.

## Past Experiences with Leadership

Question 2: 'What is the dominant leadership style in the broader Engineering Sector?'

### Company 2

While working in Chesterfield, MO I had the pleasure of working with a mechanical contracting firm which I will refer to as Company 2. This was a great experience for me-- it was a larger company than my previous internship, but still a small enough company that I met the big shots like their owner. It was easy to feel as though I was part of the family even though I was only there for 3 months, which I think alone shows the capability of many of the leaders at Company 2. Like how I overviewed the leadership at Company 1 here is an overview of the leadership styles of 3 of the leaders I interacted with most at Company 2:

Person D- The Project Manager and the main boss I worked under, was one of the best corporate level bosses I have had the pleasure of working with. While working on site at Monsanto, the project they were currently assigned to, he demonstrated many styles of leadership. In the beginning, he was highly involved with training me and his other peers. Most of which I would consider the 'share your vision' part of leadership in which he took me around the workplace showing me how things were supposed to be run as he saw it and most importantly why we did things the way we did. Then as I began

learning what things were and why we did certain tasks he would listen to my questions and then begin to engage me into the activities. This created a great opportunity in which I was pushed into the workplace, not at a crazy pace but just fast enough to always have something to learn. Overall, Person D was huge on company engagement and always had a reward waiting for excellent work. However, when work was subpar or behind, we sometimes postponed the reward, while at other times the reward was before completion which served as a motivator. This was quite interesting to me. I thought negative reinforcement would have made sense but in reality, the early reward often gave them the extra incentive they needed to finish the job on time. This type of pacesetting ('energize and push') was huge in on-site jobs as all contracts had deadlines and budgetary requirements associated with meeting key dates.

Person E- The Senior Project Manager on site was quite similar to Person D. In many ways he took the role of running the day to day tasks and interacted with the team the entire day. For this reason, his leadership style could be described as 'simply delegating'. As he was the project manager, he was not supposed to actually install the systems, rather he was to be sure the crew had all the tools necessary to do the job. He also organized them being sure the best team members were assigned to each job to enhance overall efficiency and be sure we met deadlines. Person E was often the guy who would have to simply tell everyone what to do, but luckily, he was very good at conveying why they were doing these tasks or why such deadlines were being put on them. In this case, I believe he was again using the 'simply delegating' style which is quite effective when done correctly. Rather than just tell them what to do he knew how it needed to be done

and what the end reward was thus he was combining the 'energize and push' style to get everyone back on pace and toward a unanimous goal.

Person G- The Safety Manager on site, had a very different job from the two described above. She performed her job perfectly by teaching people how to be safe. Through mandatory safety talks, safety walks, safety demonstrations, and safety luncheons she was able to demonstrate the 'teach and coaching' style well. The best part of how she went about her job was that the better she did it, the easier her job became. People were more educated on keeping themselves safe and she had to do less and less teaching and more simple refreshers. This mentality that it is easier in the long term to teach other people how to do things right, than it is to let them learn any which way is one that needs to be promoted far more in today's engineering industry with so many young engineers (myself included) entering the workforce.

### Company 3

While in Aspen, Colorado I had the wonderful opportunity to work with a number of great minds in a field that is slightly more artistic than engineering but still highly related. This was an enamoring experience both for me and the firm I was working with. For starters, my cousin had just opened this firm a few years earlier and I was the first intern they had ever had. As expected, I saw the firm at its infancy, with all the ups and downs of a new business. This gave me a firsthand experience as to how a small business gets off the ground and what kind of leadership it takes to do so successfully. (I can confirm it was successful as the firm has grown from just under 5 employees to now over 20 employees in just 3 years) And once again, in

order to retain the uniformity of this thesis, below is my take on the 3 people I learned the most from while in Aspen, Colorado:

Person H- The owner of the firm, my cousin, and a great leader. While I was an actual member of his family, he truly made the rest of his staff feel like family. To me building this family atmosphere was special. Every person kept each other up to date on their personal lives which drew the team closer together. Their willingness to listen created a group that could work extremely efficiently. The 'listen and engage' style was an extremely effective way to run a firm and lead a team. But he also knew how to have fun, and this helped to energize this family environment. The 'energize and push' style was one of Person H's fortes. He was always brightening the room and making things fun. When things started to feel stagnant, he would dress up the workplace or take us on a site visit or simply pump up the toons. These small changes made it that much easier to push. And while these are not the hardest things to do, they are exactly what many people expect in a leader, and they were highly effective.

Person I- Person H's assistant, and one of the firm's great architects, orchestrated and designed projects all in her own way, making sure to put her own touch on things. She saw the value I could add to the team and took the time each day to teach me a new skill. Without her 'teach and coach' style of leadership I never would have had any idea what I was doing in the architectural world. Another thing I learned while in this architectural environment was how people delegate. In this case, my cousin or his assistant would send me to do site visits and bring back information on the site or simply to take blueprints out to work with the team in the field. I learned the most when I was on my

own which showed the true value in delegating. While it was also the easiest thing to do, it showed a student like me that I had the power to do it on my own-- it forced me to figure out how to complete the task given. The 'simply delegate' style was very effective in getting things done and it also taught me a lot which made it even better for myself and the firm.

Person J- An Architect hired by the firm to assist in projects. Person J was often off working with the site-specific side of projects: the meetings with the county to request permits, the onsite client meetings, or the site visits to take pictures of each site. He was often so busy I had to stop him just to see what he was doing. Upon following him closer, he was actually a very interesting leader, doing things his own way. When working with the client or the city he was rarely the first one to talk, rather he took the 'listen and engage' route. Listening first to the clients wants and needs then engaging them. This is how the firm avoided conflicts-- he was all ears for their issues and the consequent solutions. As the old saying goes, 'the customer is always right' and this was Person J's viewpoint with clients. But after hearing them out I often saw him go even further. If their ideas did not mesh with the final product, he had to show them more convincingly and that was when he employed the 'share your vision' technique. Not shutting them down entirely but showing them where these seemingly simple changes would result in larger changes down the road, and quite possibly even problems for the homeowner.

Answer 2: 'What is the dominant leadership style in the broader engineering sector?'

Table 1: Leadership Styles Usage Frequency

Company	Company Style	Leader	Style
Company 1	Pacesetting	Person A	Coercive
		Person B	Pacesetting
		Person C	Coaching/Pacesetting
Company 2	Pacesetting	Person D	Authoritative/Pacesetting
		Person E	Delegating/Pacesetting
		Person G	Coaching
Company 3	Authoritative/ Democratic	Person H	Democratic/Pacesetting
		Person I	Authoritative/Delegating
		Person J	Democratic/Authoritative



Figure 1: Number of Leaders Using Each Style

Conclusively, I documented a total of 9 leaders from 3 different companies. This information shows a total of 5 instances where a leader regularly used pacesetting, 3 leaders who used coaching, 2 used authoritative, 2 used democratic, 2 used delegating, and 1 used

coercive. This leads me to believe pacesetting is the dominant leadership style used in the industry. This makes sense as the world is only speeding up. Shorter deadlines, more meetings, and more projects are being completed and all in the same 7-day week. At each of these companies, I saw different instances where this 'too much to do, too little time' idea set in and caused the leaders to energize their teams pushing them harder and harder. For Company 1, automation was coming in leaving less people to do the same jobs. For Company 2, the company was too small for all the contracts it was given, leaving workers to get pulled to other job sites at any given time. For Company 3 they also had too many projects to complete with their current workforce and thus had to hire more employees. Overall, I conclude that pacesetting is a must learn leadership skill for any engineer.

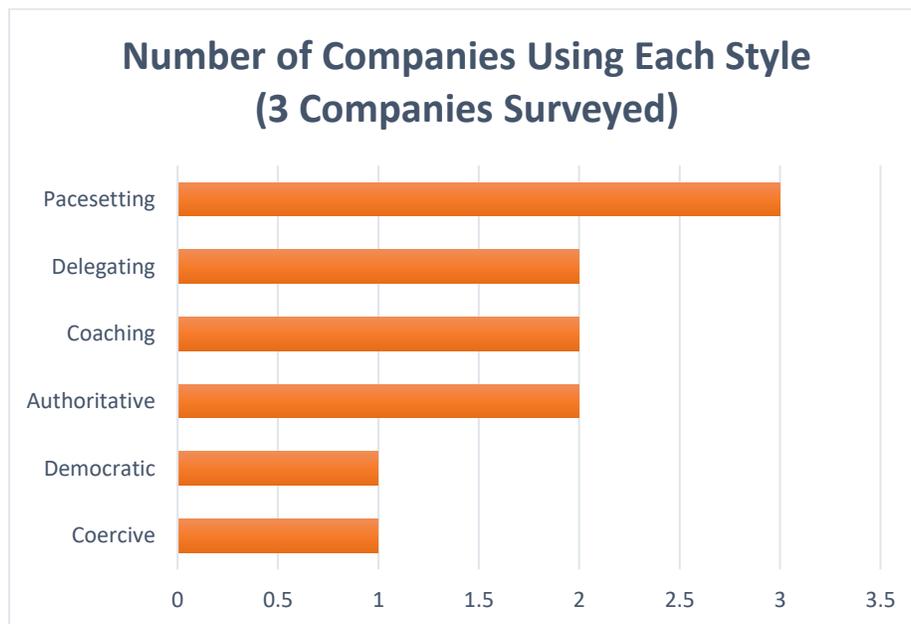


Figure 2: Number of Companies Using Each Style

## Idealistic Leadership in Engineering

Some people might question how much leadership truly has to do with engineering. Engineering and leadership are likely far more integral than many people realize and if you are reading this you already know this. Nonetheless, my examples above prove how engineers and leaders can be and in many cases are one and the same.

While there are companies where businessmen and women are at the helm; as is the case with Company 1, many of the organizations I have worked with and worked for were started or are currently led by an engineer. Even at a massive conglomerate like Company 1 which had a CEO and COO etc. who were not engineers, many engineers still held leadership positions within the global level of Company 1. In this way, I believe it is vital for current engineers and future engineers to learn and utilize leadership skills. But which leadership skills are most useful in this industry? That is precisely what I am aiming to answer with this thesis.

Question 3: 'What is the dominant leadership style entry-level engineers should know in order to be successful?'

First, to look at this question from a singular perspective I must present the definition of "Success", I am using. In this case I will use a definition defined by Robyn Paul and Dr. Lynne Cowe Falls, Professors at the University of Calgary Schulich School of Engineering. They define career success not only by looking at objective success; (think things like "salary, upward mobility, and managerial level"), but also, subjective success; (things like "self-defined aspirations, values, need, standards and career stages"). (Paul 2) Looking at success through

this holistic lens is essential and I believe this can impact which leadership styles one should utilize in order to achieve both objective and subjective success. In their paper titled: *Comparison of Career Success Competencies and Engineering Leadership Capabilities*, the authors delve into how the results of an engineer's career successes are directly impacted by leadership education. They used *The Capabilities of Effective Engineering Leaders* developed by Bernard M. Gordon of the MIT Engineering Leadership Program. This document includes the "Attitudes of Leadership, Relating, Making Sense of Context, Visioning, Delivering on the Vision, and Technical Knowledge and reasoning". (Gordon) Comparing the above with *The Career Success Competencies Model* developed by Eby, Butts, and Lockwood: "Knowing Why, Knowing Who, and Knowing How" we can conclude that 'knowing why' along with knowing the 'attitudes of leadership' had the highest correlation. All these leadership traits correlated to success competencies and thus:

"This indicates that teaching engineering students' skills in leadership would have a positive impact on their career. These results are valuable to all engineering students, not just those who plan to pursue a career in leadership".

(Paul 6)

Answer 3: 'What is the dominant leadership style entry-level engineers should know in order to be successful?'

Leadership in itself is something far too large to learn only one way to lead. It is rarely something you learn in one day and only apply to one scenario. In this way, it is hard to pick one style which is best for someone to learn. Bernard M. Gordon of the MIT Engineering Leadership

program contributes leadership rather to teaching students a new way of going about life. He believes it breeds these 'Attitudes of Leadership' which I have listed as follows:

- Initiative
- Decision Making
- Responsibility and Urgency
- Resourcefulness, Flexibility
- Ethical Action and Integrity
- Trust and Loyalty
- Equity and Diversity
- Vision and Intention
- Self-Awareness and Self-Improvement (Gordon)

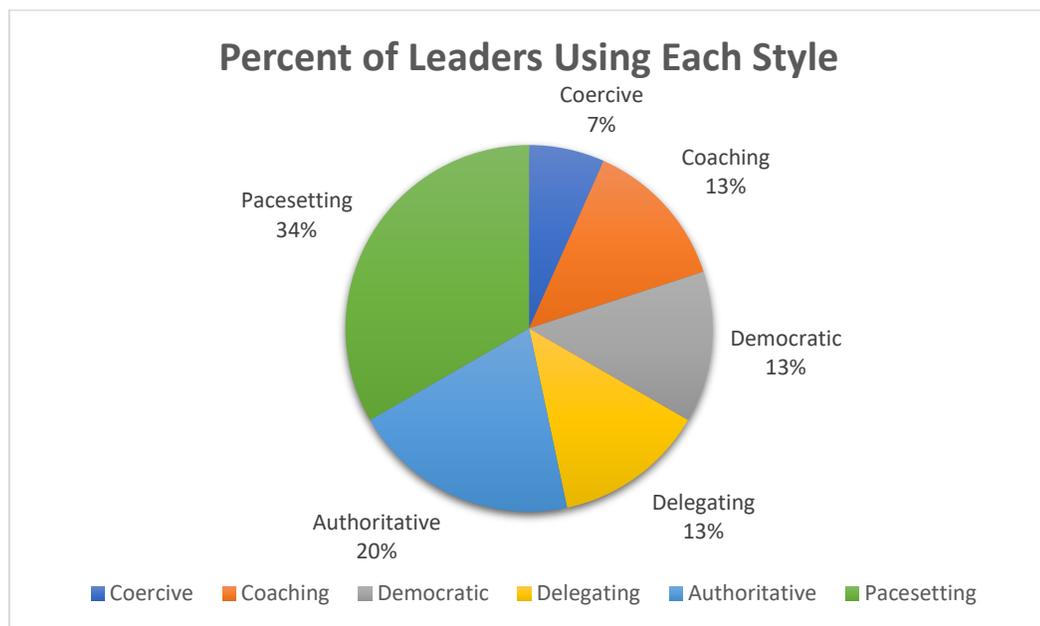


Figure 3: Percent of Leaders Using Each Style

Thus, students must strive to learn leadership in its entirety, not simply for one instance. But for the purpose of this study, I have compounded the table above which along with the above definition of success, allows me to rank the leadership style as they pertain to how I have seen them used in the industry.

First, would be pacesetting as the world is moving far too fast for any innovative team to remain stagnate. The ability for a leader to push their team without burning them out is second to none in the go-go-go style workplace. This is also the one style I have seen used most and it seems all good leaders know how to utilize this technique at a moment's notice.

Second, I would choose authoritative. It is almost impossible to get a team working like a well-oiled machine if they do not have a well-established reason for performing such tasks. Employees, managers, co-workers, and leaders all need to feel useful and having the understanding of why they are doing a job gives them a vision to work for, and end goal, and a purpose for showing up and putting their blood, sweat and tears in every week.

Third, would be democratic leadership. In a robotic world, one might assume people would not question anything, but humans are not that simple. A leader may share their vision and state why employees are doing each job but that does not mean the employees will not question when, where, or how they are to get the job done. This is where the democratic style comes into play. When people are wanting to share their input to better the final product, the leader must listen to this. Each team is better when everyone can share their ideas openly. I have seen this time and time again in each place I have worked. Even the seemingly 'lowest guy on the totem pole' (this was me more times than not) will have a bright moment and it is the leader's job to utilize these ideas for the betterment of the individual and the company.

Fourth, would be coaching. As I am writing this geared toward entry-level engineers, I believe being able to learn and develop the characteristics of a lifelong learner (National Academy of Engineering 53) are something we must first seek. But even at its most basic,

anyone can coach others. All that is required is the knowledge of how to complete a task and the knowhow to help someone learn for the future. In the workplace this was often as simple as coaching an employee who was performing an unsafe act, and while they may have been previously taught it, it is not uncommon for people to forget simple things and a good coaching session can remind them and refresh their previous learned knowledge.

Fifth, delegating is perhaps the easiest leadership style to use but the hardest to do well. At first it seems very easy to give away tasks and make your team do their job, but that is the easy part. For delegation to be truly successful one must make sure their team once again understands the 'why' behind what they are doing and energize them to keep them on pace and on task.

Lastly, the coercive style is one that can often be used wrong or perceived badly if done incorrectly, therefore, I have it last in the rankings. In many of the cases I have seen it used; it comes off as aggressive. For engineers who share similar experiences as myself, who are driven on their own, being told exactly what to do is not the most positive experience. We would rather problem solve on our own and be able to come up with our own solutions. Yes, there is a time and place for this style as is it the case for all of them, but this is one which the leader needs to be all too cautious when using in order to keep their team morale high.

After all, I would like to remind students that leadership is in many ways a lifestyle. One that will benefit the user in every way as is documented in numerous papers. Being a leader is far more than simply occupying a leadership position with a company, it can extend to every aspect of one's life and will continue to benefit each aspect in which it is utilized.

## Limitations

This Thesis relates and contributes to the realm of engineering leadership by documenting my personal experiences within entry-level engineering positions and correlating these experiences with their relative importance to engineers as we seek success within the engineering sector. While the results are indicative of a clear link between certain types of leadership and certain outcomes in desired positions, it is important to realize this study is limited to my personal experiences. It is small in size and while I attempted to remove personal bias, this is almost entirely impossible to do as I view the world through my own personal lens.

## Further Research

As with any educational topic, further research will benefit the students and help quench the industry's need for bright new engineering leaders. In order to further this study, 3 questions should be asked:

1. Have other entry-level engineers had similar experiences regarding the relevance of leadership within engineering?
2. Do different industries require entry-level engineers to know different leadership styles?
3. At what rate does leadership training speed up an engineer's career? A long-term study would be required to follow engineers with both with and without leadership training to compare the average pace at which they are promoted.

Without leadership in engineering many of the most successful teams would simply be unable to work so seamlessly together which is why studies like these are so vital.

## Conclusion

Leadership skills for entry-level engineers are a must in order to be successful overall. As proven in multiple studies, leadership skills have a clear correlation to both objective and subjective success within engineering. As it pertains to entry-level positions and their growth outlook within such positions, knowing at least one leadership style will greatly benefit every engineer. But knowing how to use a multitude of techniques will change the trajectory of one's career and quite possibly change their whole life for the better.

## Acknowledgements

I would like to start by thanking my Advisor, Dr. Bruce DeRuntz, who has been much more than simply an advisor to me. Almost like my 'father away from home', he mentored me through my years in the Leadership Development Program and pushed me to be the best I can be. Without him I would not have been lucky enough to have such a variety of experiences to write about. I would also like to thank the many bosses and managers I have had over the years who gave me such amazing examples of leadership to write about. I would also like to thank my parents. First for reading this thesis time and time again, and more so for supporting me through these extremely fast 4 years. And lastly, to my brother, for keeping a smile on my face and always being the person who understands me like no one else. I can not thank you all enough!

## Biographical Summary

Connor Eigelberger is from Fenton, Missouri and has been studying Mechanical Engineering at Southern Illinois University Carbondale (SIUC) since August 2016. He has had 2 internships and took the Fall semester of 2019 to work a 6-month Co-op. He will graduate from SIUC on May 9th, 2020. From there he will be headed to Syracuse, New York to work for Anheuser Busch in their brewery training program.

## Works Cited

- Allen, Scott & Jenkins, Daniel & Schwartz, Arthur. (2017). Collegiate leadership competition: an opportunity for deliberate practice on the road to expertise.
- Ebby, Lillian T., and Butts, Marcus, and Lockwood, Angie. "Predictions of success in the era of the boundaryless career." *Journal of Organizational Behavior*, vol. 24, no. 6, pp. 689-708, 2003.
- Gordon, Bernard M. *Toward a New Engineering Education Consensus: Ideas from Industry and Academia for Inculcating and Fostering Leadership Skills*. Gordon Foundation, 2012.
- Gordon, Bernard M. - MIT Engineering Leadership Program "*Capabilities of Effective Engineering Leaders*". 2011.
- Hartmann, Beth L., and Charles T. Jahren. "Leadership: Industry Needs for Entry-Level Engineering Positions." *Journal of Stem Education*, vol. 16, no. 3, Sept. 2015, pp. 13–19., doi:10.1109/emr.2016.7559063.
- Hartmann, Beth Lin, et al. "Journal of Professional Issues in Engineering Education and Practice." *Validating the Importance of Leadership Themes for Entry-Level Engineering Positions | Journal of Professional Issues in Engineering Education and Practice | Vol 143, No 1*, ASCE, 2017, [ascelibrary.org/doi/10.1061/%28ASCE%29EI.1943-5541.0000301](https://doi.org/10.1061/%28ASCE%29EI.1943-5541.0000301).
- Knight, David B. "Educating the Engineers of 2020: An Outcomes-Based Typology of Engineering Undergraduates." *The Pennsylvania State University*, ProQuest LLC, 2012, pp. iii-8.
- National Academy of Engineering. 2004. *The Engineer of 2020: Visions of Engineering in the New Century*. Washington: National Academies Press.
- Paul, Robyn, and Lynne Cowe Falls. "Comparison of Career Success Competencies and Engineering Leadership Capabilities." *Proceedings of the Canadian Engineering Education Association (CEEA)*, University of Calgary, 6 June 2015, [ojs.library.queensu.ca/index.php/PCEEA/article/view/5811](https://ojs.library.queensu.ca/index.php/PCEEA/article/view/5811).

## References:

Person H . "Company 3: Homepage." *Company 3*, 2020, [www.Person H.com/](http://www.Person H.com/).

Grover, Tim S., and Shari Lesser Wenk. *Relentless: from Good to Great to Unstoppable*. Scribner, 2014.

Hernon, Peter, and Terry Ganey. *Under the Influence: The Unauthorized Story of the Company 1 Dynasty*. Simon & Schuster, 1991.

"Home." *Home | Company 1*, 2020, [www.Company 1.com/](http://www.Company 1.com/).

Julio, Sophia. "The Significance of Leadership-Development Programs." *Southern Illinois University Carbondale*, 2018.

Kouzes, James M., and Barry Z Posner. *The Student Leadership Challenge: Five Practices for Becoming an Exemplary Leader*. The Leadership Challenge, 2014.

Lakhiani, Vishen. *The Code of the Extraordinary Mind: Ten Unconventional Laws to Redefine Your Life & Succeed on Your Own Terms*. Rodale, 2016.

"Mechanical Contractors St Louis." *Company 2*, [www.Company 2.com/](http://www.Company 2.com/).

Rover, Diane. "2013 IEEE Frontiers in Education Conference (FIE)." *Engineer of 2020 Outcomes and the Student Experience*, pp. 140–146.

Walker, Melody. "Company 1 Merger Still Stings 10 Years Later." *St. Louis Public Radio*, 13 July 2018, [news.stlpublicradio.org/post/Company-1-merger-still-stings-10-years-later#stream/0](http://news.stlpublicradio.org/post/Company-1-merger-still-stings-10-years-later#stream/0).