Exploration of Career and Ethical Challenges of Analytics and Generative Artificial Intelligence in an Engineering Leadership Course

Dr. B. Michael Aucoin P.E., Texas A&M University

B. Michael Aucoin is a Senior Lecturer in the Department of Engineering Technology & Industrial Distribution at Texas A&M University, an Adjunct Instructor in the School of Leadership Studies at Gonzaga University, and President of Electrical Expert, Inc.

Zhendi Zhang, Texas A&M University
Miles O. Dodd, Texas A&M University

Miles Dodd is currently pursuing a Master's degree in Engineering Technology at Texas A&M University. His research interests include semiconductor testing and validation, as well as hardware cybersecurity. Miles is a teaching assistant in the Department of Engineering Technology and Industrial Distribution, assisting with engineering leadership, semiconductor testing, and semiconductor validation classes. His experience facilitating lab sections for the engineering leadership class has allowed him to gain insights into students' beliefs about generative artificial intelligence and its future role in engineering leadership and higher education.

Exploration of Career and Ethical Challenges of Analytics and Generative Artificial Intelligence in an Engineering Leadership Course

Abstract

Recently, Generative AI (GenAI) has gained rapid and extensive use. This technology has profound implications for workplace productivity in a way that offers impressive benefits and potential downsides and abuse. Accordingly, both career and ethical challenges loom before us. Engineers will be instrumental in the design and application of this technology; therefore, it is incumbent on universities to prepare them now to wrestle with these challenges. This responsibility is particularly important in the context of engineering leadership development. In this paper, we present work-in-progress of design and effectiveness of delivery of initial interventions on this topic in an undergraduate Engineering Leadership class at Texas A&M University. This technology already shows the potential to dramatically change the trajectory of careers; many fear the elimination of jobs. At the same time, others believe that GenAI will create entire new fields of employment and opportunity. Meanwhile, parallel concerns are detrimental effects on cybersecurity and privacy. A portion of our course content covers the broad topic of data innovations, including GenAI. The lecture that includes this topic provides connection to servant leadership. Our guiding principle is to practice mastery of this technology in ways that enhance humanity and promote transparency. A key assignment includes prompts for associated laboratory teams to grapple with career and ethical dilemmas on GenAI use. In this paper, we provide a literature review, and then describe the course content that includes data innovations including coverage of GenAI and their application to leadership. Next, we relate the prompts and instructions to laboratory teams and the requirements for them to report on their related deliberations. For feedback on the value of these initial attempts, we will perform mixed-methods research. We will survey students on the value of the content and activities in the context of preparing them for leadership roles in workplace decision making on GenAI. A parallel survey of industry representatives provides their perspectives on how they would like university engineering leadership development to be done on these topics. We conclude the paper with a discussion and recommendations for future work.

Introduction

While generative artificial intelligence (Gen AI) first became available for widespread use in late 2022 (in the form of OpenAI's ChatGPT platform), this milestone is the latest in a long march of increasingly sophisticated developments in harnessing computational power [1] for a variety of applications. For this paper, we will generally address how computational power and the use of data is increasingly impacting the practice of leadership. We will speak broadly to the impact of *big data* and more specifically to Gen AI, but all under the umbrella term of *data-enhanced leadership.* We use this phrase to capture the phenomenon that computational power is greatly expanding its impact and influence in leadership, i.e., data, and computation on it, is used to enhance the practice of leadership. These developments have wide-ranging impacts for organization and will force us to address thorny ethical challenges.

This work will address a small slice of the overall picture, i.e., an initial exploration in the Fall 2023 semester of student and industry perceptions about specific ethical questions on Gen AI's impact on careers and the workplace. The intent is to help students in our undergraduate Engineering Leadership class at Texas A&M University to be resilient in their own careers and to navigate the ethical waters of Gen AI in decision making in their workplaces.

We use a *flipped classroom* approach in our engineering leadership course. In each weekly module, students "teach" themselves concepts through online readings and videos in an asynchronous format at their convenience. When we convene in person in lecture and lab, we focus on clarification and application of the concepts. We believe that it is in attempts to apply the concepts that they really come alive.

Members of our team previously gave conceptual presentations on this topic [2], [3]. In the present paper, we describe the results of student and industry surveys on data-enhanced leadership and specifically Gen AI. Because we have a foundation of emotional intelligence in the course, we deem it important and worthwhile to explore the emotional elements associated with a topic. When we're introducing new content, we also feel it's best to include early surveys that are simple and incorporate open-ended opportunities for feedback to look for trends that can be used to provide more emphasis or re-direct our efforts as appropriate.

We next describe the module content related to our topic, with relevant background and context. The online content is oriented as a broad presentation of how data can inform the practice of leadership. Then, we will move to the live lecture and lab activities associated with Gen AI.

Data-Informed Insights in Leadership

Data has long been used to inform and provide insights for the practice of management and leadership. Nonetheless, there has been a dramatic shift in the volume and use of data in recent years, and this trend is accelerating. As of 2023, 67 percent of human resource officers are evaluating new technologies for their functions, including workforce analytics [4]–a phrase that will be explained momentarily.

What is presently occurring in organizations began in sports in the 2000s. Amid poor performance in 2002, the Oakland Athletics Major League Baseball team transitioned from using heuristics in talent management to more intensive use of data. Their approach focused on situational on-field advantages while also slashing salaries by using out-of-favor players. Their experiment worked in dramatic fashion, and soon teams throughout major sports incorporated *sports analytics* in talent management. The Athletics' experience became known as *Moneyball*, as captured in the titles of a Michael Lewis book and subsequently a major Hollywood movie.

It is worthwhile to emphasize that the movement is from *heuristics* alone to using data, to inform leadership. With the rise of Gen AI, we have platforms that create new data from existing data, or restated, we can easily produce vastly more data. Neither big data nor Gen AI eliminate heuristics, but they allow the automation of some tasks and some heuristics, while introducing data that requires new types of decisions to be made and related heuristics to be accessed.

Sports analytics is simply one implementation of a general trend to optimize the use of the talent in an organization. When applied generally, the term *workforce analytics* is often used. This term has been defined the function as, "the discovery, interpretation, and communication of meaningful patterns in workforce-related data to inform decision making and improve performance" [5]. This definition definitively connects workforce analytics to the practice of management and leadership.

It is helpful to note common means used to provide insights on patterns in data. *Data analytics* involves analyzing data and the methods in which it is gathered, sorted, or stored, including insights into how to draw meaningful conclusions. The idea of *artificial intelligence* (AI) dates to 70 years ago and is based on the possibility that human intelligence could be described so well that a machine could replicate it. Over time AI has predicted outcomes in chess, emulated speech, and performed image and facial recognition. *Machine learning* is a newer field within AI that uses algorithms to build a model based on sample data that is then used to decide or predict an outcome based on new data. With sufficient data and time, these models can be quite accurate. Machine learning is the power behind facial recognition, medical image diagnosis, financial trend predictions, and many other cutting-edge fields. Newer algorithms do not require training data sets; they can derive models based on observing raw data.

Generative artificial intelligence (Gen AI) is artificial intelligence that can "create new content and ideas, including conversations, stories, images, videos, and music. AI technologies attempt to mimic human intelligence in nontraditional computing tasks like image recognition, natural language processing (NLP), and translation" [6].

For our purposes, it is also worthwhile to define three other terms to describe how data may be used in leadership activities. *Data-informed* decision making implies that data that provides information and prompts questions and deliberation. *Data-influenced* decision making implies that we consider other factors in our decisions, e.g., organizational values and strategy. *Data-driven* decision making is that motivated by objective information and less by intuition [7].

Uses of Data in Leadership

Numerous commercial platforms are available for different types of workforce analytics functions, including recruiting, performance measurement, compensation, workforce planning, and retention. Analytics tools are also used for real-time correlations between coaching and engagement, as well as for patterns of time management [8], [9], [10], [11]. Facial scans can be used to detect and analyze employee emotions [12].

To reemphasize and for context, these applications are all oriented to optimize talent management in organizations. It is the organization of humans to perform work that results in a valued product or service for a customer/client/constituent. Over centuries of history, advantage has been gained by using increasingly sophisticated technology to augment human capabilities. Technology can both create new classes of jobs and eliminate existing classes. Gen AI is one such technology.

In one major and notable example of the use of workforce analytics, Google analyzed hundreds of their teams to identify the elements that led to those that led to good and poor team dynamics and

outcomes [13], [14]. Other implementations of workplace analytics are early in exploration or development. There are applications for using wearables to measure stress and anxiety, and worker health, safety, and well-being. Amid the Covid-19 pandemic, there were efforts to use wearable biometric data to predict when workers might be infected [15], [16]. While initial work has been done in sports to characterize the elusive factor, *team chemistry* [17], doing so in the workplace is generally seen to be a "Holy Grail" goal [18].

Connection to Engineering Leadership

W. Edwards Deming, the well-known expert in quality management, said, "Without data, you're just another person with an opinion." Engineers have long made extensive use of data in understanding, designing, testing, and optimizing engineered systems., e.g., for statistical process control in manufacturing. In other words, engineers implicitly accept and embrace data about engineering processes. In a related sense, data from our social processes in organizations is equally important. Such context can help us navigate topics about the use of data to inform leadership.

This context is particularly important given the emotional tenor often used in predictions of Gen AI's impact on the workforce–whether it is a promise of a "Gold Rush," or a warning of doom.

Ethical and Application Considerations

Every technology comes with the prospect of both valued and problematic purposes; Gen AI is no different in that regard. Some have forecast the technology to eliminate entire classes of jobs while others predict it will create other classes of jobs. McKinsey (2023) predicts Gen AI to add up to $4.4 trillion to the global economy. In contrast, AI, and by extension Gen AI, benefits non-academically trained workers while having a negative impact on those who are academically trained [19], a development of particular interest to our engineering students. This effect occurs by *technology-enabled deskilling*, or the use of technology to reduce the skill level needed for a job.

The march of technology presents opportunities in the workplace for productivity improvements, sometimes dramatic ones [20]. Obvious productivity improvements occur when workers can perform tasks more quickly or they can tackle a greater range of tasks or responsibilities. In our lecture, we use the domain of talent management, and specifically employee engagement, as an example application of data-enhanced leadership for class discussion. Gen AI can potentially benefit employee engagement through improving their experiences at work. One guide claims this approach provides organizations that achieve such experiences realize 31 percent greater revenue growth than those that do not [21]. As one example, Gen AI can quickly recommend next-step actions for managers based on regular employee surveys. This feature is critical for employee engagement because most employees report they fail to see tangible evidence that superiors act on complaints, requests, and recommendations in such surveys [22].

Monitoring and surveillance of workers offers the prospect of boosting productivity, performance, engagement, and morale, as well as providing information to enhance leadership practice. Notwithstanding these benefits, there are also potential *creepy* aspects to tracking members of an organization. Employees may readily perceive the technology to be overly invasive and Big Brother-

like and used against them [15], [23]. Accordingly, ethical and application considerations are critically important in addressing workforce analytics and leadership.

Unquestionably, the use of Gen AI and big data can be perceived as threatening by employees. How do we best apply workforce analytics to reap its benefits while avoiding its abuses? The question is best answered with having clarity about our beliefs and values. This territory is best navigated by organizational values and culture that emphasize the wellbeing of *both* the organization and its members. It cannot be a balancing act of tradeoffs; the interests of both must be aligned and synergistic! Accordingly, guidance of the application of Gen AI and data-enhanced leadership must be a shared and collaborative endeavor that is undertaken with transparency. Such an approach will encourage individuals to embrace the technology and therefore obtain its benefits. Failure to follow this approach may lead to distrust and resistance, leading only to compliance or attempts to defeat or trick the system. Ultimately a human focus is needed [24], and an ethics charter can assist this objective [15].

Restated, this territory calls for us to practice *servant leadership.* In our course, we define servant leadership as a practice to equip others and ourselves to thrive. Servant leadership serves as a compass to apply Gen AI in such a manner to promote our humanity and potential.

Beyond what Gen AI may mean for productivity and profit, what does it portend for our human essence? Forward-thinking individuals see technology as a tool that can promote our humanity. As Griffiths and Mallon assert, at first technology substituted for workers, then it was used to augment them; but now, technologies are emerging that are "enabling humans to become better humans and teams to become better teams" [25].

Live Meetings

With this content background in the students' pre-class preparation, we can now turn our attention to the live course activities. Live lecture and lab activities are intended to provide opportunities for clarification, application, problem solving, and sense making.

Lecture

In live class meetings, we employ educator Parker Palmer's [26] approach of bringing *big questions* into the midst of the room–we apply this concept in the form of prompt questions on application of course concepts. Palmer reported that this method of vigorous engagement makes it easier to learn to think like a prototypical member of a profession.

The prompt questions for this topic are based around an application scenario that the students may encounter in their future careers. Such a scenario approach makes the consideration more real and personal. It also gives students the opportunity to apply course concepts to the scenario at hand. We used three prompt questions based on scenarios for all-class discussions. All three scenarios involve a company-wide facial recognition system to monitor employee engagement and use the information to boost productivity.

Scenario 1 supposes that the student is early in his or her career and has become aware that the employer is already using this system without having consulted with or informed lower-level

employees. Scenario 2 supposes that the student is now in charge of a work group and has been approached by superiors to help plan and roll out the use of such a system. In Scenario 3, the student leads a team that has been commissioned by the employer to design and develop such a system to be sold to other organizations.

Laboratory

Among other activities in lab, student teams are asked to address, discuss, and reach a collective position on Gen AI scenarios they may encounter in the professional workplace. Teams are asked to complete two sub-tasks on this topic, both based on the assumption that they are working as an engineering professional in 2028.

The first sub-task is to "ask" ChatGPT for a response to one of three optional questions; these questions essentially ask the technology to predict its own evolution toward human intelligence and specifically emotional intelligence. Overall, students must then apply critical thinking to the response and develop a position statement. The intent is to help students wrestle with how to use Gen AI technology in a helpful manner. The three options for students to address are: 1) will AI be able to experience emotions as humans do, 2) will humans accept directions on work tasks from an AI interface that interacts like a human supervisor, and 3) will an AI interface be capable of effectively mentoring humans in the workplace much like a human manager might?

The second sub-task is to address one of two optional scenarios they may encounter that will affect their own jobs or the jobs of others. The intent of this sub-task is to help students prepare for the impact of potential employment disruptions Gen AI may cause, to develop personal resilience and adaptability, and to promote humanity and servant leadership. The first scenario option, the students assume the role of an engineering manager, and the superior has directed them to lay off one-half of the engineering team as they are being replaced by AI. They must deliver the news, communicate empathy to laid-off workers, boost their motivation to move forward, and provide them assistance with alternative employment. For the second scenario option, the superior has just informed them the company plans to eliminate most engineering positions in the coming year because they will be performed by AI. The students are to report how they will maintain their motivation, adapt, and position themselves to become more valuable to the company and avoid layoffs.

In their Team Report submitted at the end of the semester, student teams were required to report on their activities on these two sub-tasks. Specifically, they identified which prompts they chose, the process by which their team discussed and argued perspectives on the prompts, and the resulting team position as supported by course content.

Survey Questions and Results

We are most interested in how the course content and activities prepared students for this evolving world. Again, as this is a new effort, our approach has been a high-level survey of both students and industry representatives regarding their perspectives.

Student Survey Questions and Results

During the final lecture meeting of the semester, students were asked to complete an online survey of nine questions, six of which offered on Likert-scale responses, and a final question that offered an opportunity for open-ended perspectives on how well students felt the course prepared them for handling ethical issues associated with Gen AI. Table 1 summarizes the Likert-scale questions; for all these questions, the range for responses was from very unhelpful (1) to very helpful (7).

Number	Question topic	Mean	Std Dev	Mode
1	Will Gen AI be helpful in your work	5.58	1.45	6
2	Will Gen AI be helpful to perform your work in ethical manner	4.58	1.60	5
3	Was first task (Ask ChatGPT) helpful as preparing to handle ethical issues	5.07	1.71	6
4	Was second task (Scenarios) helpful as preparing to handle ethical issues	5.18	1.58	6
5	Helpfulness of course as preparing to handle ethical issues	5.46	1.29	6
6	Helpfulness of lecture & associated exercise as preparing to handle ethical issues	5.39	1.47	5

Table 1. Student Likert-scale questions on helpfulness of various course activities.

The range of comments in open-ended responses indicated that the class felt overall that the coverage of Gen AI was somewhat helpful to very helpful, but a substantial number of students felt it was not. The mood was generally negative about Gen AI technology. Other notable responses included: 1) our coverage was helpful in opening dialogue but didn't go far enough to prepare against "dystopian" outcomes, 2) an observation that this topic seemed to be a sharp turn from emotional intelligence, and 3) that it gave opportunity to think about these issues before having to wrestle with them in the workplace.

Student Reports and Results

Most students expressed skepticism of AI's capability to genuinely comprehend human emotions and effectively mentor humans in the workplace by 2028. One-third of teams acknowledge AI's current ability to mimic or simulate human emotional responses to some extent. However, they highlight the disparity between the intricate nature of human emotions and the inherent limitations of AI as a machine incapable of proper understanding. Consequently, students anticipate that people will find it challenging to trust AI in supervisory roles in the workplace. However, a minority expressed optimism that as AI evolves rapidly, it can improve its understanding of human emotions.

Students believe that AI poses a potential threat to human workers in the workplace as it gradually replaces human labor. Students have outlined various strategies to address these challenges: the emphasis on continuous learning and self-improvement, collaboration between AI and humans, and human networking. Two-thirds of teams assert that it is essential to adapt with the trend of AI replacing human labor and maintain motivation for self-enhancement, ensuring their suitability for areas where

AI struggles to replace human capabilities fully. Several teams highlighted the importance of collaborating in work with AI, so that its strengths complement that of humans. As career networking is emphasized in our course, one-third of groups emphasize it for workers whose employment is affected by AI-related layoffs. They also expressed concerns that AI's potential for replacing human labor can undermine organizational culture and create anxiety in the workplace.

The consensus among students was that the relationships forged between leaders and their teams are as important, if not more so, than a leader's efficiency. The capacity of a leader to see their team as individuals and empathize with them was deemed one of their strongest traits, casting serious doubts on AI's ability to replace human leaders entirely.

While not a requirement of the assignment, many students took the opportunity to comment on their present experiences in higher education. Their views revealed a perceived generational divide in views on AI ethics. In thinking about their present experiences in higher education, students believed their progressive outlook might foster broader acceptance of AI in education, contrasting with perceived cynicism of faculty. Such skepticism may stem from concerns that AI could undermine traditional academic values by providing an easier path to obtaining results. This situation calls for a dialogue between generations, i.e., between faculty and students, to establish guidelines that balance innovation with academic integrity. The goal would be to ensure AI's use aligns with educational values, fostering an environment where technology enhances learning without compromising ethical standards.

Generally, students were optimistic about AI's future capabilities but doubted its ability to truly replace leadership roles. There is hope AI will become more widely accepted as a tool that enhances work, shedding the negative connotations it currently holds.

It is noteworthy that most teams relied on ChatGPT to compose responses to prompts. One-third relied on it heavily, under one-fifth very little, and the remainder used a balance of ChatGPT and their own independent analysis.

IAC Survey Questions and Results

The IAC is a small group of eight members, but all completed the survey quickly. The IAC survey was simpler than that of the students, but we also attempted to cast a wider net. This industry survey had only three questions, two of the Likert-scale type, and three that allowed open-ended responses on the two Likert-style questions, and one on any other thoughts respondents had about Gen AI. Table 2 provides a summary of the two Likert-scale questions; for these questions, respondents were asked to select their level of agreement with two statements. The range for responses was from strongly disagree (1) to strongly agree (7).

Perhaps because the sample size was small and relatively homogeneous, the industry representatives tended to agree on the necessity of graduates being skilled in two areas: 1) the tools that incorporate Gen AI technology as well as the limitations of them, and 2) the ethical issues and the implications that surround this technology. Other notable comments included: 1) the need for students to learn and practice how to properly attribute sources of information retrieved from Gen AI tools, and 2) the observation that Gen AI technology is already far ahead of teaching.

Number	Question topic	Mean	Std Dev	Mode
1	Engineering UG programs should prepare students for career impacts from Gen AI	6.25	0.89	7
2	Engineering UG programs should prepare students to address ethical considerations about applying Gen AI	6.50	0.53	6, 7

Table 2. Industry Likert-scale questions on responsibilities of engineering undergraduate programs.

Discussion

Recall the Gen AI application that recommends actions to managers based on levels of employee engagement from surveys. In lecture, we adapt and bring such an application into the classroom for discussion. What if the instructor has a dashboard that provides real-time assessments of student engagement, and recommended next-step actions to the instructor to adapt? Even when presented as a benefit for the student experience, the class nevertheless resisted the prospect as an intrusion on their privacy.

As some industry representatives noted, Gen AI is already accepted and used heavily in the workplace, therefore our teaching on the topic is in some respects playing catch up. The fact that many students have a general bias against Gen AI is cause for hope, because that mood will promote ethical scrutiny; and cause for concern, because the technology unquestionably can be a helpful tool.

It is interesting that both students and industry representatives insinuated faculty to be behind the curve for this technology. While we did not study this angle further, we believe this finding is related to the responsibility of faculty to promote academic honesty. To fulfill this role and forestall abuse, many faculty members have understandably limited and scrutinized student use of Gen AI. Perhaps this stance comes across as curmudgeonly. How best to make use of this technology in the academy will be an important and evolving process that may significantly impact our paradigms on curricular delivery and student assessment.

Notwithstanding real concerns over abuse, the proverbial genie will not return to the bottle. The issue for students who will practice engineering leadership is how to apply it effectively and in a way that does not promote abuse. Similarly, the issue for faculty is how to welcome this technology in teaching while upholding high ethical standards.

Leadership is fundamentally an intervention activity. To practice leadership, we see what needs to be changed or done and act upon the organizational system in a way that brings the system to a better state. More extensive use of data and Gen AI offer the potential to provide better insights to guide leadership decisions and actions. Furthermore, these tools permit such insights and interventions to occur much more quickly than ever before [8].

Engineers have long taken for granted the benefits of real-time data on adjusting processes to promote the quality of manufactured components. Analytics and Gen AI offer the opportunity to bring a similar capability to the social processes of an organization. Whether for an engineered or social system, we are most effective when we work with objective and timely data.

Argyris [27] reminds us that when performing any leadership intervention to be clear about the strategy for the intervention. Clarity is promoted by returning often to first principles in leadership that involve our beliefs, values, and knowledge about people as individuals and in organizational relationships. We would do best to practice behaviors that uphold the humanity of employees and not to consider them as components in an organizational machine. One student commented that humans will always be capable of greater things than machines. This opinion leads us to both comfort and concern; it is in our human nature to be capable of both help and harm. Therefore, we best proceed grounded in healthy human values.

With all leadership interventions a key guiding principle is to *keep our brains engaged!* Every leadership intervention is ultimately an experiment, and therefore what we seek is incremental change [28]. Every intervention experiment generates more data and learning.

It is worthwhile to draw insights from the over two-decade experience with sports analytics. Much like what we heard from our students, many athletes were initially hesitant or even resistant to the use of analytics on their performance. Over time, sports analytics evolved to holistic measures of performance, i.e., considering not only in-game analysis, but also factors such as training, nutrition, sleep, and deliberate rest days. One could characterize this evolution as toward servant leadership as applied to sports. Perhaps such an evolution will take place in the larger workplace.

If we use workforce analytics properly it will enhance our humanity; troublesome application of it will strip away humanity and treat people as objects [24]. Fledgling engineering managers/leaders will themselves be analyzed and will likely participate in the analysis of others. This content has been developed to help them prepare themselves for considering how this technology can enhance our humanity. Perhaps paradoxically, this exploration helps us see how the practice of leadership is evolving to become about *both* soft skills and hard data. A comment from Deloitte [29] provides a guiding compass for our way forward.

> …[Thriving] depends on an organization becoming—and remaining—distinctly human at its core. This is… a different way of being, one that approaches every question, every issue, and every decision from a human angle first… Today's environment of extreme dynamism calls for a degree of courage, judgment, and flexibility that only humans and teams led by humans can bring. A predictable world can be effectively dealt with by algorithms and equations. A messy world cannot, even in an age of increasingly intelligent machines.

Limitations and Future Work

The curricular exploration of analytics and Gen AI in leadership is an exploratory one intended to provide students with information, stimulate thought and discussion, and orient them to appropriate application of the technology. It is intended to present the topic through the lens and skill set of engineering. The work presented here is primarily the result of secondary research and simple and limited surveys of students and professionals. This exploration remains a work in progress. It is not intended to supplant current approaches to leadership development of engineers as they all have merit. Observation of the use in the course and coupled with future student and industry surveys will be

important to guide future use of this content and activities. It is worthwhile to emphasize that the exploration of this topic is valid to the extent that it is found useful by students, faculty, practicing engineers, and organizations.

Conclusions

This paper has provided the results of the development of a curricular content in leadership implications of workforce analytics and Gen AI for an undergraduate engineering leadership course. The presentation of this content to students is intended to prepare them for the workforce and orient them to appropriate application of the technologies. It is intended to present the topic through the lens and skill set of engineering. The presentation is consistent with the thematic framework of the course that demonstrates the extensive common ground between engineering and leadership. The presentation approach demonstrates that leadership is evolving from being perceived as predominantly a soft skill to incorporating more hard data–including hard data from Gen AI. In this way engineers can further perceive the practice of leadership to be more like engineering.

References

[1] D. Guest and V. Pereira, "The implications of generative artificial intelligence for HRM-related outcomes: Analysis and research implications," *Human Resource Management Journal,* vol. 33, pp. 619-620, 2023.

[2] B. M. Aucoin and B. Bowen, "Engineering leadership: Transitioning from "soft skill" to hard data," in *Proceedings of the 2021 ASEE-GSW Conference*, Waco, TX, 2021.

[3] B. M. Aucoin, "How to serve?: When leadership transitions from "soft skill" to hard data," in *Gonzaga Leadership Symposium*, Spokane, WA, 2021.

[4] PwC, "Workforce transformation at PwC," 2023. [Online]. Available: https://www.pwc.com/us/en/services/consulting/business-transformation/workforce-transformation.html. [Accessed January 2024].

[5] N. Guenole, J. Ferrar and S. Feinzig, The power of people: Learn how successful organizations use workforce analytics to improve business performance, Pearson FT Press, 2017.

[6] Amazon Web Services, "What is generative AI?," 2023. [Online]. Available: https://aws.amazon.com/what-is/generative-ai/]. [Accessed January 2024].

[7] C. Anderson, Creating a data-driven organization: Practical advice from the trenches, Sebastopol, CA: O'Reilly Media, 2015.

[8] Deloitte University Press, "Global human capital trends 2017: Rewriting the rules for the digital age," 2017. [Online]. Available: http://www2.deloitte.com. [Accessed January 2021].

[9] P. A. Gloor, "What email reveals about your organization," *MIT Sloan Management Review,* 2015.

[10] K. Waddell, "The algorithms that tell bosses how employees are feeling [Weblog]," 2016. [Online]. Available: https://www.theatlantic.com/technology/archive/2016/09/the-algorithms-that-tell-bosses-how-employees-feel/502064/. [Accessed January 2021].

[11] R. Gelbard, G. R. Ramon, A. Carmeli and R. M. Bittman, "Sentiment analysis in organizational work: Toward an ontology of people analytics," *Expert Systems,* vol. 35, no. 5, pp. 1-15, 2018.

[12] R. Subhashini and P. R. Niveditha, "Analyzing and detecting employee's emotion for amelioration of organizations," *Procedia Computer Science,* vol. 48, pp. 530-536, 2015.

[13] Google, "[re: Work] – Understand team effectiveness," n.d.. [Online]. Available: https://rework.withgoogle.com/print/guides/5721312655835136/. [Accessed January 2021].

[14] C. Duhigg, "What Google learned from its quest to build the perfect team," 2016. [Online]. Available: https://www.nytimes.com/2016/02/28/magazine/what-google-learned-from-its-quest-to-build-the-perfectteam.html. [Accessed January 2021].

[15] T. Chamorro-Premuzic and I. Bailie, "Tech is transforming people analytics. Is that a good thing?," Harvard Business Review Online, Retrieved from:," October 2020. [Online]. Available: https://hbr.org/2020/10/tech-is-transforming-people-analytics-is-that-a-good-thing. [Accessed January 2021].

[16] D. Kassick, "Workforce analytics and human resource metrics: Algorithmically managed workers, tracking and surveillance technologies, and wearable biological measuring devices," *Psychosociological Issues in Human Resource Management,* vol. 7, no. 2, pp. 55-60, 2019.

[17] L. Bransen and J. Van Haaren, "Player chemistry: Striving for a perfectly balanced soccer team," in *Proceedings of the MIT Sloan Sports Analytics Conference*, Boston, MA, 2020.

[18] M. Schrage, "Team chemistry is the new Holy Grail of performance analytics," March 2014. [Online]. Available: https://hbr.org/2014/03/team-chemistry-is-the-new-holy-grail-of-performance-analytics. [Accessed January 2021].

[19] M. Xue, X. Cao, X. Feng, B. Gu and Y. Zhang, "Is college education less necessary with AI? Evidence from firm-level labor structure changes," *Journal of Management Information Systems,* vol. 39, no. 3, p. 865–905, 2022.

[20] McKinsey & Company, "The economic potential of generative AI: The next productivity frontier," 2023. [Online]. Available: https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/the-economic-potential-of-generative-ai-the-next-productivity-frontier. [Accessed January 2024].

[21] IBM Institute for Business Value, "Experience is everything: The CEO's guide to generative AI customer & employee experience," January 2023. [Online]. Available: https://www.ibm.com/thought-leadership/institute-business-value/en-us/report/ceo-generative-ai/employee-customer-experience. [Accessed January 2024].

[22] D. Zielinski, "How generative AI is transforming engagement surveys [Weblog]. SHRM. Retrieved from:," 11 December 2023. [Online]. Available: https://www.shrm.org/topics-tools/news/technology/how-generative-ai-is-transforming-engagement-surveys. [Accessed January 2024].

[23] Deloitte University Press, "Global human capital trends 2018: The rise of the social enterprise," 2018. [Online]. Available: http://www2.deloitte.com. [Accessed January 2021].

[24] Deloitte University Press, "Global human capital trends 2019: Leading the social enterprise: Reinvent with a human focus," 2019. [Online]. Available: http://www2.deloitte.com.. [Accessed January 2021].

[25] M. Griffiths and D. Mallon, "Powering human impact with technology," 9 January 2023. [Online]. Available: https://www2.deloitte.com/xe/en/insights/focus/human-capital-trends/2023/human-capital-and-productivity.html. [Accessed 2 February 2024].

[26] P. Palmer, The courage to teach, San Francisco, CA: Jossey-Bass, 2007.

[27] C. Argyris, "Effective intervention activity," in *Organization development: A Jossey-Bass reader*, San Francisco, CA, Jossey-Bass, 2006, pp. 158-184.

[28] J. Akred, S. Mathur and E. Wilder-James, Directors, *The experimental enterprise: Building a data-driven business [Video],.* [Film]. Addison-Wesley Professional, 2017.

[29] Deloitte University Press, "Tech trends 2021," 2021. [Online]. Available: http://www2.deloitte.com. [Accessed November 2022].