Diversity and Inclusion: The Implications and Effects of Canon 8 on the Civil Engineering Profession and Student Chapters

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Introduction

The beginning of the 21st Century saw the development of new perspectives on diversity and inclusion in the workplace and academia. The American Society of Civil Engineers (ASCE) formally addressed diversity in 2017 by adopting Canon 8 into its Code of Ethics. According to Canon 8, "Engineers shall, in all matters related to their profession, treat all persons fairly and encourage equitable participation without regard to gender or gender identity, race, national origin, ethnicity, religion, age, sexual orientation, disability, political affiliation, or family, marital, or economic status" [1]. This canon states that any discrimination within the civil engineering profession or student chapters based on superficial differences will not be tolerated. Despite the recent strides in social justice, the civil engineering profession remains dominated by select groups of people. A lack of diversity can lead to discriminatory acts and feelings that hinder teamwork, cause feelings of inferiority, and prevent innovation. A lack of innovation and teamwork make it difficult for the United Nations and ASCE to achieve their goals in creating an inclusive and sustainable future. However, Canon 8 can help solve those issues. Its ideas can be used to make changes and introduce programs in the workplace, and in student chapters, that promote the idea of personal responsibility. A future where every engineer is personally responsible for their own actions is one where innovation flourishes and engineers work to the best of their abilities.

Background: Diversity and Inclusion in the Civil Engineering Profession

Before analyzing diversity and inclusion in the civil engineering profession, it is imperative these terms be defined. In the context of Canon 8, diversity is the inclusion of different types of people in a group or organization [2]. According to Bernardo Ferdman, editor of *Diversity at work: The practice of inclusion*, inclusion involves working successfully with others despite differences, making others feel as though they are valued as a member of a group and can comfortably share ideas and opinions, and acting in a way that is fair and considerate of different types of people [3]. Due to underrepresentation of minority groups, diversity and inclusion is an issue for the civil engineering profession. Of the entire 2016 population of civil engineers, only 13.4 percent were women, only 11.0 percent were Asian, and only 3.4 percent were Black [4]. There is also underrepresentation of certain demographics in academia. A 2013 study revealed that about 20 percent of undergraduate engineering students and 9 percent of engineering faculty were women. Similarly, African Americans, Hispanics, and Native Americans held less than 15 percent of all bachelor's degree in science and engineering [5]. A lack of diversity in student engineering

chapters causes problems for the workplace, especially when firms are not actively addressing these problems. According to a study done by Forbes Insight on the diversity programs of different companies, 65 percent of companies had recruitment programs, 53 percent had development programs, 44 percent had retention programs, 12 percent had programs that didn't address diversity, and 2 percent had no programs [6]. This lack of diversity causes issues for innovation in the civil engineering profession because studies have shown that a non-diverse and non-inclusive environment discourages contributions teamwork, reduces academic and social ability, and creates a distaste for the engineering field [7 and 8].

How Canon 8 Affects Innovation

Civil engineers should not be treated differently based on race, gender, or any other superficial factor. A lack of diversity causes tension between the majority and the minority and hinders innovation. In the Civil and Environmental Department at Rowan University, 290 students were surveyed on their feelings of comfort in different situations. Only 34.5 percent of the students said they feel comfortable being in situations where "I am the only one of my race/ethnicity". The percentages in the categories of religion, gender, and sexual orientation for the same question were 44.9, 41.6, and 37.0 percent respectively [7]. Due to the importance of the work in the civil engineering profession, Canon 8 is about more than just morals. Feelings of inferiority and the inability to feel comfortable as a minority is concerning for a civil engineer, especially when it comes to designing new infrastructure, solving new problems, and advocating for new public policy. Diversity is key in developing innovation of socially inclusive and sustainable infrastructure.

Companies that employ a wider variety of people have more engagement and creativity among their employees, which promotes innovative thinking. In a study done by Harvard Business Review, the levels of diversity of numerous companies were analyzed under two categories. The first, known as inherent diversity, involves characteristics obtained at birth, such as gender and ethnicity. The other, acquired diversity, involves traits gained from experience, such as working with diverse groups of people [9]. Employees at companies that harbored both of these traits were 45 percent more likely to report growth in their firm's market share over the previous year and 70 percent more likely to report that the firm captured a new market [9]. The inclusion of people of different ethnicities, sexual orientations, and ages brings different perspectives that can lead to novel methods and practices.

New products and services that cater to specific groups of people are more successful when those types of people are included in their creation. In 2004, Volvo employed female engineers to design the interior of a new car model, as 54 percent of new Volvo purchases are made by women [10]. The same concept applies to civil engineering. For example, the design of a new road in an area that comprises mainly of a certain ethnicity should have input from members of

that ethnic group. Any unique problems that ethnic group has with the current road can easily be solved by people who are able to empathize with and understand them. The Harvard Business Review study found that teams with a member that was of the same ethnicity as the client were 152 percent more likely to understand that client than other teams [9].

A diverse workforce in the civil engineering profession, and in the student chapters, could have a massive effect on innovation in the world's infrastructure. Engineering firms need to include a diverse population of civil engineers because that will bring many different perspectives on new problems and will lead to more sustainable and socially just infrastructure. The ideas and values presented in Canon 8 can open engineers' minds to new ways of thinking and allow them to learn and grow as engineers.

Canon 8, ASCE's Vision 2025, and the UN's Sustainable Development Goals

The ideas of Canon 8 are critical for ASCE's Vision 2025, which aims to enhance the quality of life for society by building physical and social infrastructure, introducing new ideas and perspectives, managing public safety, and being role models in governmental policy regarding infrastructure and the environment [11]. It is impossible to achieve these goals without a diverse and inclusive environment within the civil engineering profession. Discrimination causes tension and leads victims to feel inferior. Underrepresentation makes it difficult for coworkers to relate to one another and work in teams. Both situations discourage the type of creative and innovative thinking that are crucial in developing a sustainable and socially inclusive future. Proper infrastructure cannot be designed if there is not harmony within the engineering firm, and engineers cannot manage public safety if they themselves do not feel safe in their own work environment. Engineers cannot be leaders in public policy for a people they cannot identify with or work with, nor can they innovate with narrow or unfocused minds.

Canon 8 applies on a global scale as well. The United Nations is attempting to create a peaceful and harmonious future through their seventeen Sustainable Development Goals. The canon supports the types of ideals that will bring about the future that the Sustainable Development Goals are trying to achieve. The canon's ideas support Goal 9, resilient infrastructure, inclusive industrialization and innovation, and Goal 11, inclusive and sustainable human settlements [12]. This is especially important in developing countries in which inequality exists on a larger scale. Between 1990 and 2013, about 90 percent of deaths from internationally reported disasters occurred in low- and middle-income countries [12]. From 2000 to 2014, the number of people living in slums increased from 807 million to 883 million [12]. Canon 8 can help solve these issues because diversity will cause new infrastructure to be designed by individuals who understand their clients' situations. Creating an inclusive and diverse environment in engineering allows engineers to be innovative and work together with other countries to solve important issues, such as housing inequality, clean drinking water, and climate change, without being

blinded by prejudices. For ASCE and the UN to achieve their sustainability and inclusion goals, all civil engineers must embrace the changing world and adapt to its diverse environment.

How Canon 8 can be Used to Promote Diversity, Equality, and Inclusion

One way in which Canon 8 can be used to increase levels of diversity and inclusion is to use its ideas to increase representation of the minority in academia. According to Forbes Insights, 53% of companies look to universities for the recruitment of a diverse workforce [6]. Students who are unable to identify and empathize with other students and faculty are less likely to feel welcome in their major. The less comfortable they feel, the less likely they are to share ideas and opinions in group discussions. They may not go to faculty or administration with issues they have for fear of being misunderstood. This can reduce their dedication to civil engineering and reduce the diversity of the talent-pool that firms hire from.

Student chapters can solve these problems by introducing programs that promote harmony and teamwork among students. Educational workshops and group activities can help students of different backgrounds, genders, and political affiliations understand and work with one another. Introducing engineering ethics courses that include collaborative thinking and encourage students to speak up about their experiences can help them understand the importance of teamwork and inclusion. Mentorship programs that pair upperclassman with underclassmen of similar demographics can give the students someone to communicate with on any issues they may have. The engineering faculty has significant influence on the student body, so it is important that they understand how to promote harmony and diverse thinking. Faculty workshops could be introduced to teach them to understand how inclusion and equity plays a role in their students' education. Breaking down these social barriers will help students feel more comfortable contributing in class and communicating their ideas with peers and faculty and will make them feel part of the engineering community.

Similar programs should also be introduced in the workplace. Upper management and human resources need to be active in promoting equity and inclusion among engineers through mentoring, training, and counseling programs. This includes programs that explain the impact that diversity and inclusion have on innovation. All employees should be made aware of Canon 8 and the importance of its values through participation in these programs.

Conclusion

If Canon 8 were to instill one trait into every engineer, to add only one value to the civil engineering profession, it would be personal responsibility. Ideas of equality and inclusion only

mean something when people take it upon themselves to live by them. ASCE and the UN cannot achieve their goals without innovative problem solving and teamwork, so it is every engineer's duty to take diversity programs seriously, and to promote Canon 8's ideals of teamwork and understanding among firms. Otherwise, it will be difficult to create sustainable and socially inclusive infrastructure. Merit in engineering is not dictated by race, age, or gender. It is dictated by experience, dedication, and ability, so judgmental minds have no place in an engineering firm. Every civil engineer must be personally responsible for supporting the goals that Canon 8 aims to achieve because the ability to bring about positive change requires the will to embody the change itself.

References

1. “Code of Ethics,” American Society of Civil Engineers (ASCE). [Online]. Available: https://www.asce.org/code-of-ethics/.

2. “Diversity,” Merriam-Webster. [Online]. Available: https://www.merriam-webster.com/dictionary/diversity.

3. “Diversity at Work: The Practice of Inclusion 2014 2 Ferdman, B.M. and Deane, B.R. Diversity at Work: The Practice of Inclusion San Francisco, USA Jossey-Bass 2014 622pp. Hardback 978-1-118-41782-9,” Equality, Diversity and Inclusion: An International Journal, vol. 33, no. 8, pp. 808–812, 2014.

4. “Civil engineers,” Data USA. [Online]. Available: https://datausa.io/profile/soc/172051/#demographics.

5. "Engineering Societies' Activities in Promoting Diversity and Inclusion: Proceedings of a Workshop - in Brief." National Academies of Sciences, Engineering, and Medicine. 2018. Engineering Societies' Activities in Promoting Diversity and Inclusion: Proceedings of a Workshop–in Brief. Washington, DC: The National Academies Press. doi: 10.17226/25323.

6. C. Rizzy, S. Feil, B. Sniderman, and M. E. Egan, “Global Diversity and Inclusion Fostering Innovation Through a Diverse Workforce,” Forbes Insights, New York, NY, rep., 2011.

7. H. Hartman, T. Forin, B. Sukumaran, S. Farrell, P. Bhavsar, K. Jahan, R. Dusseau, T. Bruckerhoff, P. Cole, S. Lezotte, D. Zeppilli, and D. Macey, “Strategies for Improving Diversity and Inclusion in an Engineering Department,” Journal of Professional Issues in Engineering Education and Practice, vol. 145, no. 2, p. 04018016, 2019.

8. Hall, R. M., and B. R. Sandler. 1984. Out of the classroom: A chilly campus climate for women? Washington, DC: Association of American Colleges.

9. S. A. H. M. M. L. Sherbin, “How Diversity Can Drive Innovation,” Harvard Business Review, 01-Aug-2014. [Online]. Available: https://hbr.org/2013/12/how-diversity-can-drive-innovation.

10. “New Formula for Engineers: Diversity = Innovation,” ASME.org. [Online]. Available: https://www.asme.org/engineering-topics/articles/diversity/new-formula-for-engineers-diversity-innovation.

11. “The Vision for Civil Engineering in 2025,” American Society of Civil Engineers (ASCE). [Online]. Available: https://www.asce.org/vision2025/.

12. “Sustainable Development Goals .:. Sustainable Development Knowledge Platform,” United Nations. [Online]. Available: https://sustainabledevelopment.un.org/?menu=1300.

13. “Bias in the Engineering Workplace,” Code of Ethics | National Society of Professional Engineers. [Online]. Available: https://www.nspe.org/resources/pe-magazine/may-2017/bias-the-engineering-workplace.

14. D. M. Riley, “LGBT-Friendly Workplaces in Engineering,” Leadership and Management in Engineering, vol. 8, no. 1, pp. 19–23, 2008.

15. “Summary Report: Leading the Way as Full Diversity Partners—A Senior Executive Workshop on Critical Skills for Courageous Leaders,” Leadership and Management in Engineering, vol. 6, no. 1, pp. 13–19, 2006.

16. “Read ‘Engineering Societies' Activities in Promoting Diversity and Inclusion: Proceedings of a Workshop–in Brief’ at NAP.edu,” National Academies Press: OpenBook. [Online]. Available:.