

# **GENDER EQUALITY, DIVERSITY AND EQUAL OPPORTUNITIES IN ENGINEERING EDUCATION**

**Marie Magnell, Charlotta Delin, Anders Rosén**

Department of Learning in Engineering Sciences, KTH Royal Institute of Technology

**Gunnar Tibert, Carlos Casanueva Perez**

Department Engineering Mechanics, KTH Royal Institute of Technology

## **OVERVIEW OF WORKSHOP**

Students, post-graduation, need to be aware of technology's role in society and people's responsibility for how it is used, and possess the knowledge and skills to drive sustainable societal development and contribute to the transition to an equal society.

The topic of this workshop is exploring how Gender equality, Diversity and Equal opportunities (GDE) can be integrated in engineering education. Aside from environmental sustainability, the new optional CDIO Standard for Sustainable Development highlights the importance of social sustainability (Malmqvist et al, 2020; Rosén et al, 2021; Malmqvist et al, 2022). However, whereas environmental aspects of sustainability are being increasingly considered in engineering programs, social sustainability and GDE perspectives are less prominent (Hermansson & Rosén, 2021). This may be due to faculty members perceiving the inclusion of social sustainability as challenging, partly because it may be considered as being “outside their discipline and comfort zone” (Fitzpatrick, 2017).

In this workshop you will explore some of the challenges on how GDE can be integrated in engineering subjects, including teachers' and students' roles in this process, using the World Café methodology. The workshop welcomes participants with little prior knowledge and also experienced participants.

## **KEYWORDS**

Social sustainability, Gender equality, Standards: 1, 2, 3, 7, 8, 9, Optional Standard for Sustainable Development

## **DURATION**

120-minute workshop.

## **ACTIVITIES**

This workshop starts with a 15-minute introduction on the World Café methodology, and a brief background regarding social sustainability in engineering education. World Café is a method for collaborative dialogue that can be used for sharing knowledge, building relationships, exploring issues and finding new solutions. The method is based on the

group's collective knowledge and experience and cross-links the participants' perspectives and creativity to explore the question, giving results in the form of new insights and solutions.

After the introduction, participants are divided into smaller groups and distributed at different stations, where they discuss a predetermined question. Thoughts and ideas are collected on a common paper poster. After 20 minutes, participants are instructed to leave the group and join a new group. One person remains as host of the station. The host summarizes the most important insights of the previous conversation and then lets the conversation with the new question take over. The participants who go to the new stations are also ambassadors for the thoughts and ideas of the previous conversation.

The discussion topics for each table are defined by the participants in the workshop in a collective discussion before dividing into groups, building on the challenges identified in literature or from the participants own experiences. Some pre-suggested topics will also be available, i.e.:

1. How can GDE perspectives be integrated in the engineering curriculum, and the specific engineering disciplines?
2. Who can we teach GDE perspectives in engineering education, e.g., faculty members in engineering disciplines, GDE experts, or others? What are the requirements and needs for support when teaching GDE perspectives?
3. How can students, teachers, educational leaders and educational developers co-create teaching and learning for enhancing knowledge and skills on social sustainability in engineering education?
4. What crucial factors can be identified that promote or prevent integration and transformation strategies to social sustainability in engineering education?

This is repeated 3 times for a total of 60 minutes, followed by a 5-minute break. After the break, a 40-minute session of summarizing each topic/table and discussion will follow. In this final session, the participants jointly "harvest" from the conversation in each station. Harvesting means that the group summarises and shares what they have jointly arrived at with the rest of the participants.

## **TARGET AUDIENCE**

The target audience for the workshop is engineering educators with an interest in GDE aspects, but no specific background or education in GDE. This would include teaching staff, course coordinators, program directors, and others with a technical background interested in the overlap between technical areas and GDE and other aspects of social sustainability.

## **OUTCOMES**

The anticipated outcome of the workshop will be a deeper understanding of the opportunities and challenges involved in the integration of GDE in engineering education. Another outcome may be the identification of opportunities for further development and collaboration.

The material assembled and generated during the workshop will also be summarized and digitalized, and shared with the participants and the conference organizers.

## SPECIAL REQUIREMENTS

None.

## REFERENCES

Fitzpatrick, J. J. (2017). Does engineering education need to engage more with the economic and social aspects of sustainability? *European Journal of Engineering Education*, 42:6, 916-926.

Hermansson, H. & Rosén, A. (2021). *Uppföljning av KTH:s hållbarhetsmål för utbildning 2016-2020*. (Evaluation of KTH's sustainability objectives for education). Internal report V-2021-0365, KTH.  
<http://kth.diva-portal.org/smash/get/diva2:1569620/FULLTEXT01.pdf>

Magnell, M., Delin, C., Rosén, A., Jerbrant, A., Tibert, G., & Casanueva Perez, C., (2022). Integrating gender equality, diversity, and equal conditions, in engineering education. *Proceedings of the 18th International CDIO Conference*. Reykjavik, Iceland.

Malmqvist, J., Edström, K., & Rosén, A. (2020). CDIO Standards 3.0 – Updates to the Core CDIO Standards. *Proceedings of the 16th International CDIO Conference*, hosted on-line by Chalmers University of Technology.

Malmqvist, J., Lundqvist, U., Rosén, A., Edström, K., Gupta, R., Leong, H., Cheah, S. M., Bennedsen, J., Hugo, R., Kamp, A., Leifler, O., Gunnarsson, S., Roslöf, J., & Spooner, D. (2022). The CDIO Syllabus 3.0. An Updated Statement of Goals. *Proceedings of the 18th International CDIO Conference*. Reykjavik, Iceland.

Rosén, A., Hermansson, H., Finnveden, G., & Edström, K. (2021). "Experiences from Applying the CDIO Standard for Sustainable Development in Institution-Wide Program Evaluations". *Proceedings of the 17th International CDIO Conference*. Bangkok, Thailand.

<https://theworldcafe.com/key-concepts-resources/world-cafe-method/>

## BIOGRAPHICAL INFORMATION

**Marie Magnell:** is a Lecturer at Department of Learning, KTH Royal Institute of Technology, and teaches in courses for faculty members in teaching and learning in higher education. PhD in Technology and Learning. Her research focuses on change in engineering education, sustainability education, and links between teaching and professional practice.

**Charlotta Delin:** is an academic developer at Department of Learning, KTH Royal Institute of Technology, and at KTH Equality Office, and teaches in courses for faculty members in teaching and learning in higher education, with special focus on gender equality, diversity and equal opportunities.

**Anders Rosén:** is an Associate Professor in Engineering Education at the KTH Royal Institute of Technology with special focus on sustainability education, challenge-driven education, and educational transformations. Deputy Director of the KTH Global Development Hub. PhD in Naval Architecture and background as Associate Professor at the KTH Centre for Naval Architecture.

**Gunnar Tibert:** is an Associate Professor in Space Technology at the Department of Engineering Mechanics. He is Dean of Education at the School of Engineering Sciences at

KTH Royal Institute of Technology and responsible for the integration of sustainable development and gender equality, diversity and equal opportunities in the education programmes within the school.

**Carlos Casanueva Perez:** is an Associate Professor in Rail Vehicle Technology at the department of Engineering Mechanics at KTH. He is Program Director of the international Master Program in Railway Engineering. His research focus is on vehicle-track dynamic interaction, damage on wheels and rails, and subsequent maintenance needs.

### ***Corresponding author***

Marie Magnell  
KTH Royal Institute of Technology  
Dept. of Learning in Engineering Sciences  
100 44 Stockholm  
Sweden  
+46 73 460 7474  
[magnell@kth.se](mailto:magnell@kth.se)



This work is licensed under a [Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License](https://creativecommons.org/licenses/by-nc-nd/4.0/).