ETHICS-2023 Session C4 - Workshop: STS Postures as a framework for teaching ethics throughout the engineering curriculum

ETHICS-2023 Workshop, Friday, May 19 2023, 2:45 – 4:15 pm ET.

Facilitators

Nicole Mogul
University of Maryland

Tim Reedy
University of Maryland

I. WORKSHOP TOPIC AND OBJECTIVES

Participants will walk away from this workshop with insights and confidence to apply a socio-technical systems (STS) approach ("STS Postures") to engineering ethics. STS Postures calls for the design of learning experiences around three areas of practice: analytical approaches, data collection, and body/mind engagement, and is rooted in the interdisciplinary field of the same acronym, Science and Technology Studies (STS) (Tomblin and Mogul).

Workshop attendees will practice STS thinking during interactive demonstrations of classroom-tested activities, debriefs for reflection and listening, and studio time during which they propose "tiny experiments" to test this approach in their own fields. No matter the participants' disciplinary field, work setting, or type of class (capstone, introductory course, ethics-as-a-stand-alone class, upper-level electives, or fundamental principles of engineering) participants will imagine ways to operationalize this framework in pursuit of their workplace/classroom goals.

II. BACKGROUND

STS Postures was developed as a pedagogical tool for engineering and computer science majors in a two-year (15 credit) undergraduate STS living-learning program by one of the workshop leads and was later scaled to an engineering ethics course (ENEE200) and the Science, Technology, Ethics, and Policy (STEP) minor at the University of Maryland College Park. It synthesizes insights from the disciplinary field of STS, experiences from teaching socio-technical integration to undergraduate STEM majors, and public engagement methods citizen deliberations on science and technology topics (Kaplan et al). The framing of ethics as a set of skills (Herkert, Nieusma) and ethics as a "set of sensitive ethical antennae" (McGinn) guide this framework. Sensitive ethical antennae are not equipment, but a pursuit, like any personal or professional goal.

The framework is forward-looking and undergirded by "design thinking" techniques, and therefore complements the design element of any engineering practice or course. As the workshop facilitators prepare to scale ENEE200 to all engineering majors, they are building and using the STS Postures framework as a shared vocabulary to speak about ethics in any course in the engineering curriculum.

III. FORMAT

During the workshop participants have the chance to experience STS Postures in at least four demonstrations, reflect and pose questions in a supportive setting, connect this approach to their own workplace practices, rapidly prototype and test a teaching/learning experiment of their own.

IV. WORKSHOP OUTLINE

1. Opening Posture – STS Postures ice-breaker connects body/mind to ethics and justice.

2. Participants identify an area of opportunity in their courses, either generalized or focused, and share with a partner, small group and/or large group.

3. Participants engage in several immersive experiences (that leads use in the classroom) of different lengths of time.

4. Reflection and debrief goal to cement understanding and appreciation of a skills-based approach to ethics/socio-technical systems thinking.

5. Bio-break with stretching and informal conversation.

6. Participants revisit their area of opportunity and possibly reorient.

7. Independent or in teams: participants choose STS Postures (data collection, body mind and analytical approaches) that may be most easily linked to their challenge/opportunity.

8. Participants outline/design an immersive experience, using STS Postures, that could be tried in their own workplace.

9. Participants test their prototype with small group.

10. Group Debrief.

11. Closing Gesture to lock in body/mind connection.

V. Alignment with the Conference Theme

Participants will engage in active-learning classroom activities that operationalize neuroscience research, engineering ethics research, Science and Technology Studies, design thinking, and mindfulness skills, and as such addresses the conference theme Innovation in engineering education. Similarly, the workshop addresses the theme of Technology Innovation and Justice, as the body/mind aspect of the STS Postures Framework seeks to help students cultivate empathy and self-awareness -- necessary precursors to centering justice as a matter of concern. And because this approach is undergirded by "design thinking" techniques, it readily complements or enhances the design element of any engineering practice or course and is relevant to the conference theme The Future of Socially Responsible Innovation.

VI. References

Bairaktarova, D. (2022). "Caring for the future: empathy in engineering education to empower learning". *Journal of Engineering Education*, 111(3), 502–507. https://doi.org/10.1002/jee.20476

Kaplan, L.R., Farooque, M., Sarewitz, D., and Tomblin, D. (2021). "Designing Participatory Technology Assessments: A Reflexive Method for Advancing the Public Role in Science Policy Decision-Making." *Technological Forecasting and Social Change*, 171(120974).

Herkert, J.R. (2005). "Ways of Thinking About and Teaching Ethical Problem Solving: Microethics and Macroethics in Engineering." *Science and Engineering Ethics*, 11(3), 373–385.

Nieusma, D., and Lucena, J. (2013). "Engineering Education for Social Justice: Critical Explorations and Opportunities." *Engineering, Social Justice, and Peace: Strategies for Educational and Professional Reform*, Dordrecht: Springer Netherlands, 19–40.

Mogul, N., and Tomblin, D. (2022). "STS Postures: Changing How Undergraduate Engineering Students Move Through the World." *Proceedings of the American Society for Engineering Education*: Minneapolis, Minnesota.

Tomblin, D., and Mogul, N. (2020). "STS Postures: responsible innovation and research in undergraduate STEM education." *Journal of Responsible Innovation* 7, 117-127.