

Engineers are human beings too!

Dealing with values, emotions, and morality in ESD

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ESD workshop series 2024:

- 1. Introduction to Education for Sustainable Development (8-9/2, online)
- 2. There's no perfect solution to real-world problems: Teaching sustainability with wicked problems (29/2)
- 3. Engineers are human beings too: Dealing with values, emotions, and morality (1/3)
- 4. I'm not an expert in sustainability! (18-19/3, online)
- 5. How to integrate sustainability into already crammed courses (29/5)
- 6. Meeting students' expectations and leveraging their engagement (30/5)

WORKSHOP "OUTLINE"

A creative mix of presentation, group work, sketch scenes, and open discussion

Intended learning outcomes:

- Develop and implement teaching and learning activities that foster students' ability to address wicked sustainability problems.
- Critically engage with their own and students' knowledge, values, and emotions related to WPs.





What are emotions?

- Episodical: short-lived (vs moods)
- Multiple components & ways of expression:
 - Motor expression (e.g., gestures, facial expressions)
 - Neurophysiology (e.g., hormones, arousal)
 - Subjective feeling/experience
 - Motivation
 - Cognition
- Shaped by evolutionary (biological) & social contexts

(Shuman & Scherer 2014; Scherer 2005)



Why should we care about emotions in ESD?

- 1. ESD can *evoke* emotions.
- 2. Emotions can *facilitate/hinder* ESD learning and SD action.
- 3. Emotions can provide useful *information*.
- 4. Educators can provide emotional *support* for learning

Emotions in higher education

"academic emotions"



(adapted from Pekrun & Linnenbrink-Garcia 2014)

Exercise 1

Step I: individually

Identify one example for each type of emotions of a situation in which you have witnessed that emotion in your classroom.

Topic emotions
(subject content)Epistemic emotions
(learning processes)Achievement
emotions
(performance)Social emotions
(interaction,
relationships)

Step II: in groups

- 1. Briefly share your examples for each type of emotions. Can you observe similarities/differences in your experiences? (max 5 min)
- 2. Each group will be assigned one type of emotions to focus on more in depth. Choose one of your group's examples for that type of emotion and discuss: What happened and why? What did the teacher feel? What did the teacher do? What else could they have done?
- 3. Develop a short sketch scene to illustrate the situation for the other groups.

Social emotions sketch

Knowledge does not only reside in our heads

Embodied knowledge

- "knowing not (yet) able to be communicated in words"
- hidden knowledge: always present, but seldom acknowledged

Embodied learning

- "the meaning of what is learned is grounded specifically in body movement and perception" (Nathan 2021)
- "enables students to develop core transdisciplinary competencies in integrating and implementing diverse perspectives, wisdom, and knowledge" (Allen et al. 2023)

(Allen et al., 2023; Craig et al., 2018; Hegna & Ørbæk, 2021; Nathan, 2021; Sipos et al., 2008)

Embodied knowledge in pipeline engineering

Facilitates appreciating and evaluating:

- **Scale**: "Like an eight inch valve doesn't sound very big, right? Because there's no way you can lift it. You wouldn't know that unless you went to the field."
- **Practical challenges**: "How on earth am I ever going to get in there and do that weld in the middle? It's physically impossible"
- **Contextual factors**: Field experience "provides you with a context for understanding what the computer's telling you, but treating the computer as a calculation tool, not as a thinking device which will tell you whether something's true or not."
- **Risks**: "I try to transport myself ... if I can put myself in a situation where I've been in similar situations, would I be actually comfortable to actually do that operation? And I guess that only comes from the fact that I've been sitting on construction vessels that have been bouncing around in the waves as we've been doing ... welding operations on my pipeline."

(Maslen & Hayes, 2022)

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What do you feel when you think about climate change?

Waiting for responses ····

Topic emotions

"I just don't understand how you *cope* working with this. I'm close to *panicking* during this course. It's *really disturbing* to realize that the planet is about to collapse and we're heading for *disaster*!"

(undergraduate engineering student, 2012)



How can we use topic emotions for ESD? → Emotions can render values visible

Emotions are triggered when we experience

- threats towards sth we value \rightarrow negative emotions
- sth aligned with our values \rightarrow positive emotions

Emotions influence decision-making by

- activating embodied knowledge, signaling possible issues with safety, feasibility, context, ...
- communicating values to ourselves and others
- strengthening/weakening rational arguments

(Maslen & Hayes, 2022; Roeser & Pesch, 2016; Shuman & Scherer 2014; Scherer 2005)

Critical emotional awareness

is the ability to

- articulate emotions in such ways that important values and value conflicts can be made visible and openly discussed.
- identify and critically examine emotions and strategies for coping with emotions.

(Ojala, 2019, 2023)

How can we help students constructively deal with negative topic emotions?



(Ojala, 2019, 2023)

Topic emotions sketch

Emotions in higher education

"academic emotions"





EMOTE: The (Un)Emotional Engineer — Emotional Positioning and Scaffolding Vetenskapsrådet in Teaching and Learning about Wicked Sustainability Fibble ins (2021-2024)

"Stages" of epistemological development

Most Eng Ed	Absolute knowing	Knowledge is certain; focus on knowledge acquisition and "correct" reproduction
	Transitional knowing	Some knowledge is uncertain, authority can be unreliable; focus on understanding
	Independent knowing	Knowledge is mostly uncertain; relativism: everyone creates their own truths; focus on establishing subjective views
	Contextual knowing	Knowledge is contextual, judged based on evidence applicable to context; focus on criteria for making choices despite uncertainty
		(Baxter-Magolda, 1992: Lönngren, 2017: Owens, 2020: Wise et al., 2004



Epistemic challenges in learning with WPs

- Lack of knowledge
- Uncertainty/unknowability
- Ambiguity/value conflicts
- Limits of rationality
- Context dependence
 Secondary challenges:
- Risk of failure/losing face
- Lack of time/resources

(McCune 2023; Holmén & Lönngren, forthcoming; Lönngren, 2017)

Epistemic emotions

among engineering students discussing wicked problems



Are negative emotions always bad for learning?

Laughing together/creating enthusiasm can

- + Create a positive atmosphere
- + Increase engagement
- + Encourage/empower
- Mask value conflicts
- Hinder critical reflection & feedback
- Dismiss the task/other perspectives

Reassuring can

- + Reduce worry/resistance
- + Facilitate risk taking
- Facilitate/hinder critical reflection & feedback
- Reduce ambition

Activating positive epistemic emotions by reframing challenges as opportunities for learning



(Holmén & Lönngren, forthcoming)

Epistemic emotions sketch

Students may need emotional support!

(examples based on video-analysis of student group work on WPs)

- Emotional safety & belonging (achievement & social emotions)
 - $_{\odot}~$ Active listening exercises, non-violent communication, group contracts, ...
 - $\circ~$ Validate emotions, dare to be vulnerable yourself, show that you care
 - Use examples that are culturally relevant for all students
- Emotional rest (epistemic & topic emotions)
 - Short moments of convergence, humor, breaks, ..., can allow students to reground/recharge while dealing with overwhelming complexity and ambiguity
- Emotional life belts (epistemic, achievement & social emotions)
 - o artefacts/models/materials to hold on to when emotionally challenged
- Reassure & help focus on possibilities (epistemic, achievement & social emotions)
 - Clarify expectations (no perfect solution), focus on process vs product, explain that emotional reactions are part of learning, highlight strengths rather than weaknesses



EMOTE: The (Un)Emotional Engineer — Emotional Positioning and Scaffolding in Teaching and Learning about Wicked Sustainability Problems (2021-2024)

Achievement emotions sketch

Summary of today's main points

Why should we care about emotions in ESD?

- ESD can evoke emotions.
- Emotions can *facilitate/hinder* learning & action.
- Emotions can provide useful *information*
- Educators can provide emotional *support* for learning.

How can we deal with/ leverage emotions in ESD?

- Normalize emotions & facilitate (voluntary!) sharing
- Develop students' critical emotional awareness.
- Help students reframe
 - topic emotions as information about values, risks, feasibility, and context.
 - epistemic challenges as opportunities for learning
 - Use embodied learning
 - Provide emotional support



PREPARATION FOR WORKSHOP 4

- 1. Find someone in your subject area who works with ESD but does *not* participate in these workshops. Interview them about what knowledge and competencies they leverage in their ESD practice and how. Take notes and submit the most important points and submit them anonymously at <u>this link</u>.
- 2. Identify five of your personal superpowers (e.g., knowledge, competencies, preferences, experiences, interests, background, contacts, social support,) that you think are valuable for ESD. Reflect on why and how they do/can support you in doing ESD. Submit your superpowers anonymously at <u>this link</u>.

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