



INTRODUCTION TO EDUCATION FOR SUSTAINABLE DEVELOPMENT

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INTEGRATING SUSTAINABILITY INTO ENGINEERING EDUCATION

Workshop series:

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

- Presentation: What is (not) education for sustainable development (ESD)?
- Exercise 1: How can you relate SD to the subjects and topics you teach?
- Exercise 2: What competences do your students need to develop and how can you help them?
- Wrapping up and looking forward

Intended learning outcome: Able to explain and apply the basic principles of education for sustainability in the context of engineering education.





THE NORWEGIAN ACT RELATING TO UNIVERSITIES AND UNIVERSITY COLLEGES

§ 1-1 d): The purpose of higher education is to “contribute to environmentally, socially and economically sustainable development”

(LOV-2021-06-11-81, lovdata.no;
Photo: Melker Dahlstrand/Sveriges riksdag)



SDG 4 Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.



4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, **through education for sustainable development** and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development.

(<https://www.globalamalen.se/>)

WHAT IS *NOT* EDUCATION FOR SUSTAINABLE DEVELOPMENT (ESD)?

Write in the chat!



THREE TRADITIONS OF ENVIRONMENTAL AND SUSTAINABILITY EDUCATION (IN SWEDEN)

TRADITION	ASSUMPTION
Facts-based environmental education	Knowledge about environmental problems will lead to sustainable action
Normative environmental education	Developing sustainability norms will lead to sustainable action
Critical/pluralistic tradition: Education for sustainable development (ESD)	Addressing sustainability challenges requires viewing them from multiple perspectives & acknowledging conflicts of interest.

(Öhman 2009)

CHARACTERISTICS OF EDUCATION FOR SUSTAINABLE DEVELOPMENT



focuses on **content** related to sustainable development, from ecological, social, and economical perspective

develops **key competencies** for sustainable development

employs **pedagogical approaches** aligned with the goals of sustainable development (democratic, transformative, ...)

All three must be present simultaneously!

CONTENT

ESD should cover

- Climate change
- Biodiversity
- Sustainable production & consumption
- Global justice
- Risk- and crisis-management
- Poverty reduction

(UNESCO, 2017 & 2018)



Education for

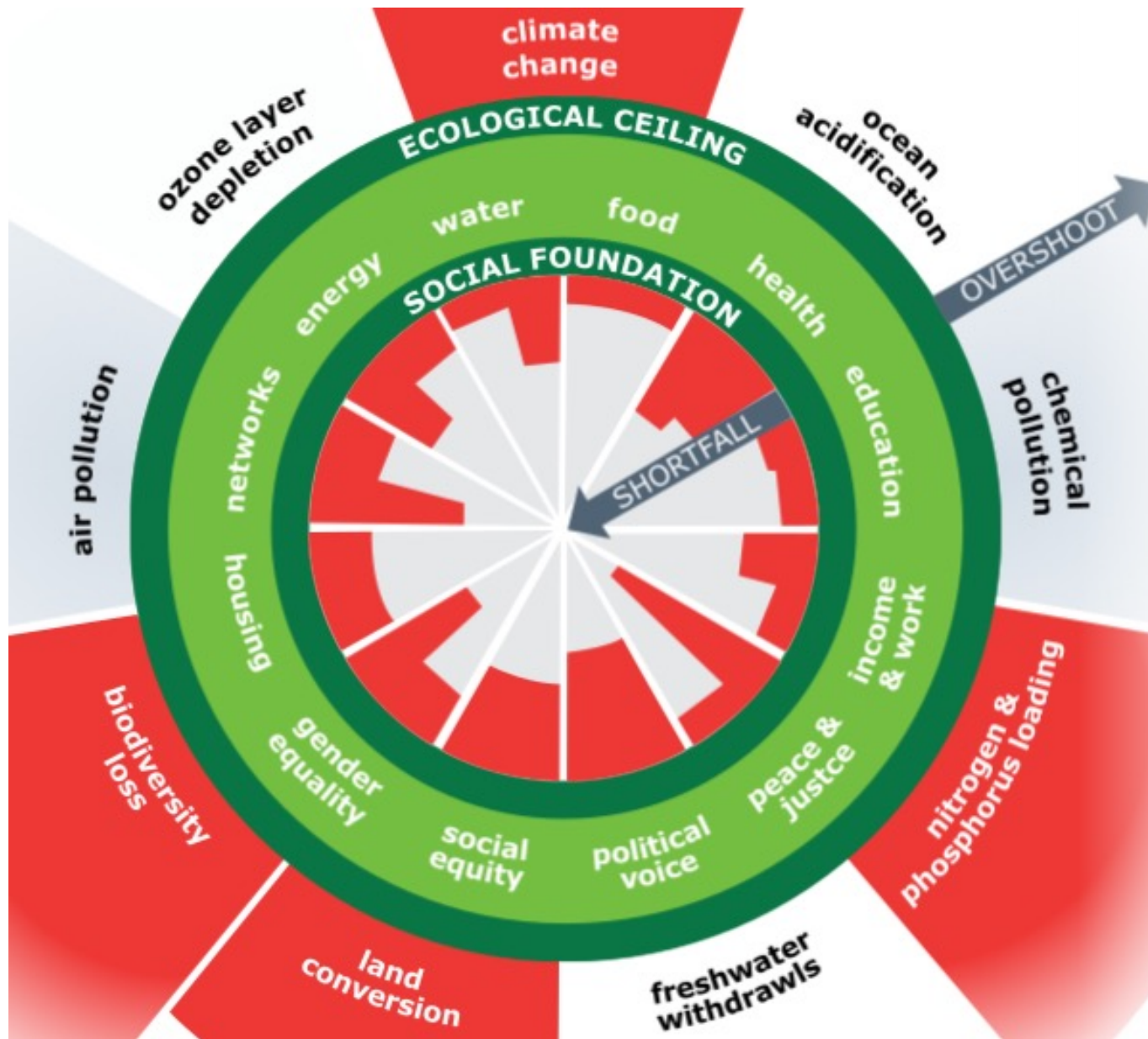
Sustainable Development Goals

Learning Objectives



SUSTAINABLE DEVELOPMENT GOALS (SDGs)





SUSTAINABILITY DONUT

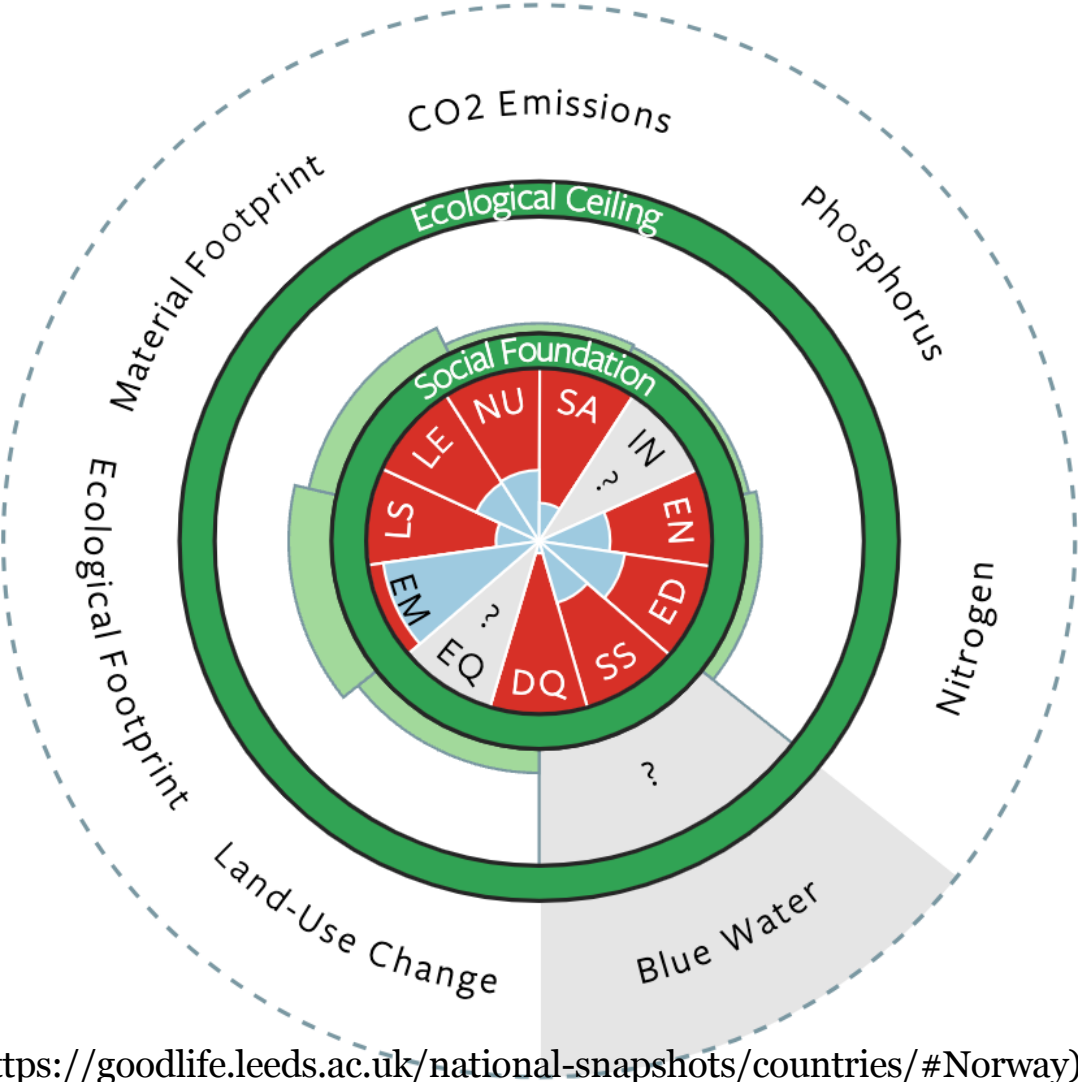
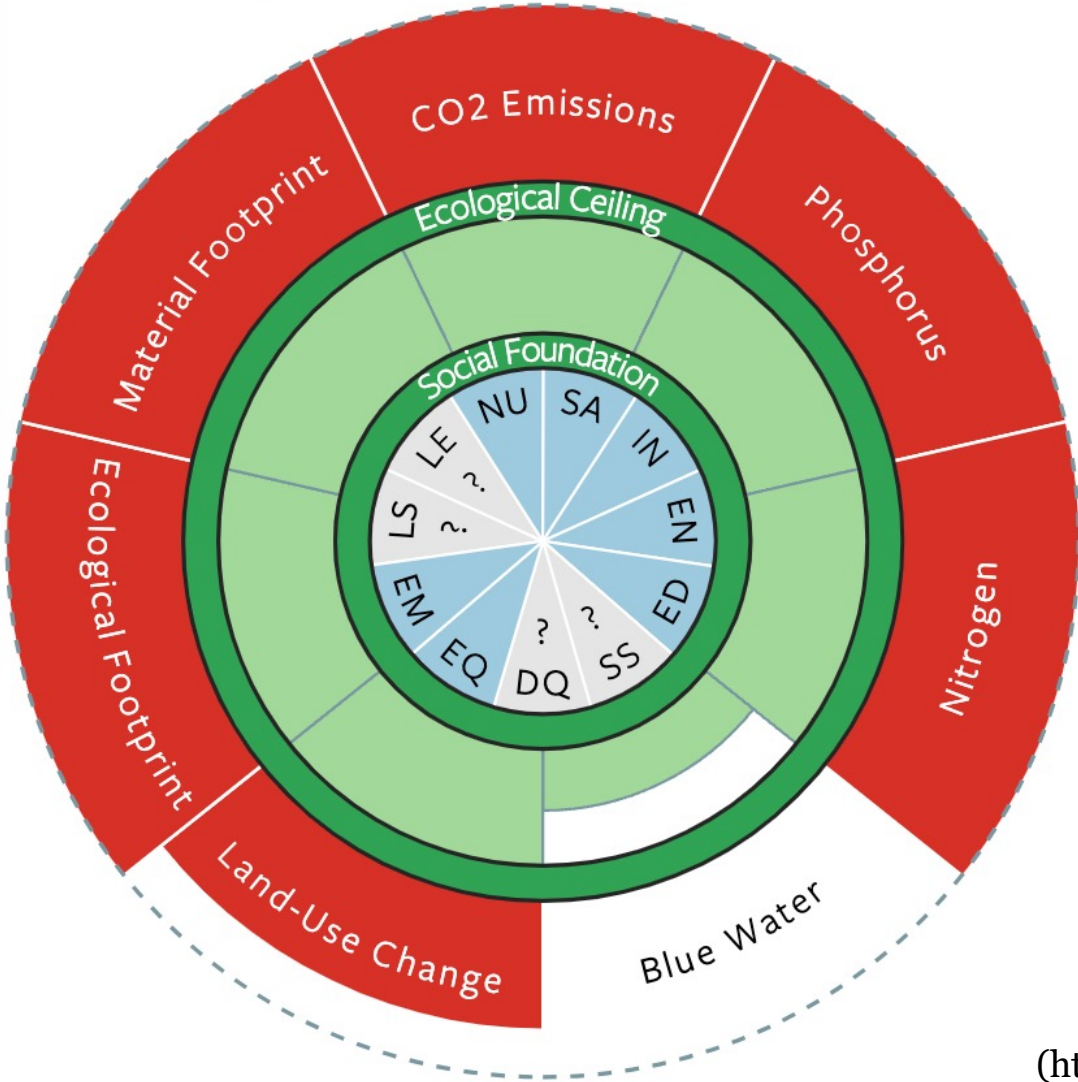
Focus on living well within the boundaries of social & ecological sustainability, between

- the *social foundation* of basic human needs and
- the *ecological ceiling* of basic planetary needs

(<https://www.kateraworth.com/doughnut>)

Norway

Afghanistan



(<https://goodlife.leeds.ac.uk/national-snapshots/countries/#Norway>)

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KEY COMPETENCIES FOR SD

Critically important for dealing with *sustainability challenges*

versus generic academic competences needed in *all* subjects and already are well-integrated in higher education.

Interconnected and interdependent

Holistic approach — all of them are needed for sustainability

Complex and challenging

All students should be trained for all competencies, but they can't all become *experts* in all competencies



(Brundiers et al 2021; Wiek et al 2011)



Competence	... is the ability to
Systems thinking	Analyze relationships and non-linear dynamics in complex systems; deal with uncertainty
Anticipatory	Develop and evaluate future scenarios; assess consequences; deal with risks and change
Normative	Identify and critically discuss and reflect norms and values; assess how they relate to values underlying the sustainable development concept
Strategic	Identify and navigate structural hindrances to achieving sustainability; iteratively assess strategies for sustainability transitions
Inter-personal	Inspire & motivate stakeholders to participate in sustainability initiatives; facilitate collaboration among stakeholders; deal with conflicts; learn from others; empathy
Intra-personal	Reflect on, assess and regulate one's own emotions, thoughts, and actions; critically reflect on one's role in local and global communities
Implementation	Implement innovative sustainability solutions; iteratively assess and adjust implementation processes; work towards radical transformation
Integrated problem solving	Combine and apply different key competencies and problem-solving frameworks to develop disruptive, inclusive and equitable sustainability solutions; transdisciplinarity

(Brundiers et al 2021)

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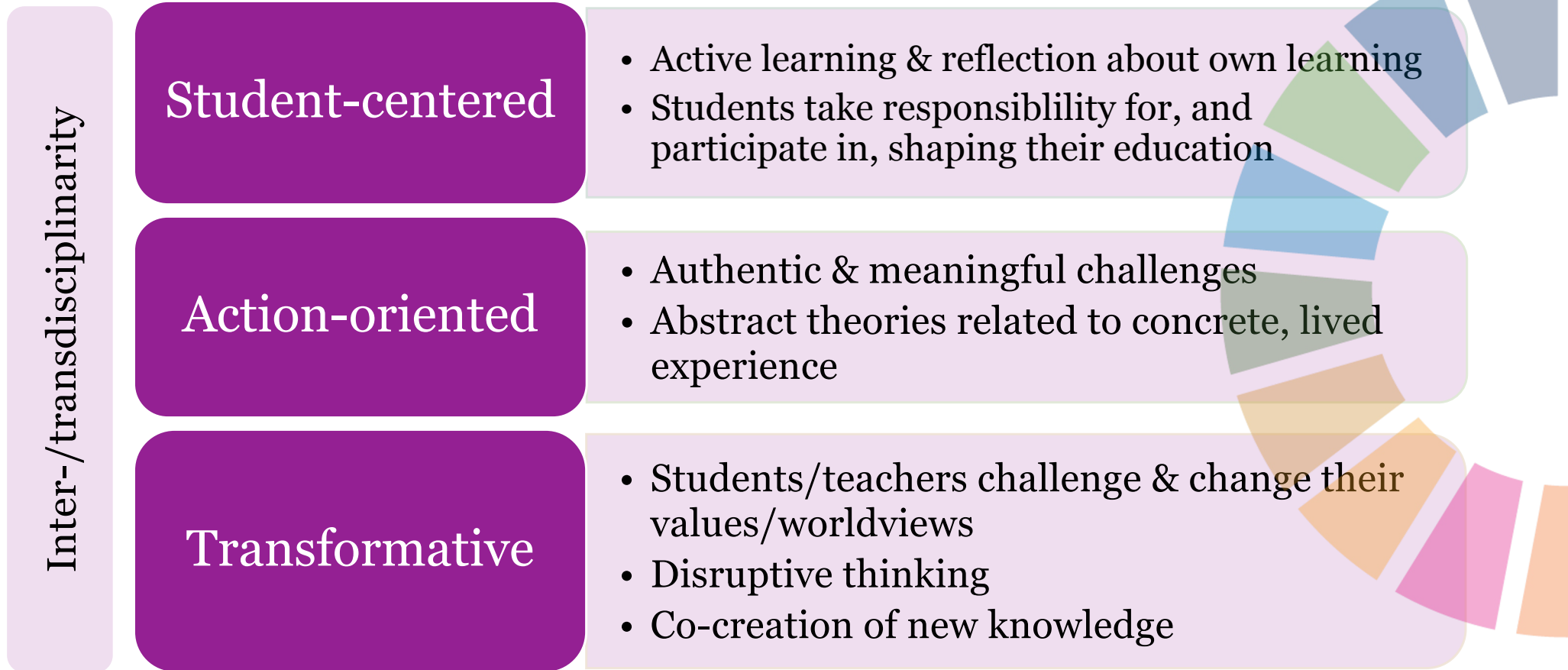
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SUITABLE PEDAGOGICAL APPROACHES



(UNESCO 2018)

CRITICISM AGAINST SD/ESD

“too much” *and* “too little”

- **Indoctrination:** teaching a given political agenda
- **Oxymoron:** sustain vs develop
- **Greenwashing:** open for different interpretations
- **Neoliberal agenda:** prioritizes economic grow
- **Neocolonial:** reproduces colonial power structures
- **Anthropocentric perspective**
 - prioritizes humans' needs and rights
 - ascribes nature only instrumental value



ALTERNATIVE SDGs

(<https://sustainabilityteachers.org/resources/>)



ESD 1: Learning *for* SD

- Learning to do things more efficiently
- Expert-knowledge-driven
- Promotes behaviour change
- Effectively drives quick/short-term change
- UNESCO/mainstream view

ESD 2 “makes [ESD1] meaningful, because our long term future will depend less on our compliance in being trained to do the ‘right’ thing now, and more on our capability to analyse, to question alternatives and negotiate our decisions.”

ESD 2: Learning *as* SD

- Learning to do different things, more effectively
- Learning to think critically, explore contradictions and value conflicts
- Empowerment & responsibility
- Open-ended, uncertain, long-term focus

(Vare & Scott, 2007)



EXERCISE 1: HOW CAN YOU RELATE SD TO THE SUBJECTS AND TOPICS YOU TEACH?

Teaching tools: Agenda 2030, learner agency

1. Visit <https://www.globalgoals.org/>
2. As a group, choose one SDG you want to work with.
(but *not* SDG 4!)
3. Review the SDG in more detail, including its targets.
4. Discuss how the subject areas/professions you teach for may impact the possibilities of achieving the SDG by 2030.
Consider both positive/negative and direct/indirect impact.
5. Prepare to briefly present your group's results in plenum.

(alternative website: <https://fn.no/om-fn/fns-baerekraftsmaal>)

EXERCISE 2: WHAT COMPETENCES DO YOUR STUDENTS NEED TO DEVELOP AND HOW CAN YOU HELP THEM?

Teaching tools: Mentimeter, learner agency



1. Individual reflection: Read the short descriptions of the key competences. Which one(s) are particularly important for your students?
2. Visit menti.com and enter the code 5519 5545. Answer the questions.
3. Choose a breakout room, named as a key competence you wish to explore further.

EXERCISE 2: WHAT COMPETENCES DO YOUR STUDENTS NEED TO DEVELOP AND HOW CAN YOU HELP THEM?

Teaching tools: co-creation, learning by doing



4. In each breakout room, discuss the following questions:

- Why do you think this competency is particularly important for your students?
- What learning activities might help your students develop this competency?
- Prepare to briefly present one possible learning activity in plenum.



**Can you think of anything
– no matter how small –
that you can do *before the next*
workshop to better integrate
sustainability into your teaching?**

Write in the chat!

(and feel free to save the chat to get more
inspiration from your colleagues' ideas!)

PREPARATION FOR WORKSHOPS 2 AND 3

- **Read:** McCune, V., et al. (2023) Teaching wicked problems in higher education: ways of thinking and practising, *Teaching in Higher Education*, 28:7, 1518-1533,
<https://www.tandfonline.com/doi/full/10.1080/13562517.2021.1911986>
- **Review your own teaching:** Can you identify any lectures, modules, or courses in which you could integrate ESD by simply tweaking or adding some content, activities, and/or pedagogical approaches?
- **Formulate an intended learning outcome** for ESD that you could use for any of your teaching and reflect on possible teaching and learning activities that could help your students reach that learning outcome.

REFERENCES

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- Öhman (2009). Att utbilda för hållbar utveckling – ett pluralistiskt perspektiv. I Demetriades, M. & Karlström, C. *Nycklar till framtiden: Lärande för hållbar utveckling*.