Toning courses with sustainability

Mette Lindahl Thomassen
VIA UC, Aarhus University
Horsens, Aarhus, Denmark

Hanne Løje
Technical University of Denmark
Ballerup, Denmark

Agenda

- Introduction (10 min)
- Hands-on activity (60 min)
- Wrap up (20 min)

Introduction

- Sustainability is an increasingly important topic all over the world and engineers have an important role.
- Engineering education has achieved some milestones regarding sustainability with regards to awareness of the sustainability crisis/challenges
- Our prior research propose that engineering education needs to shift from a strategic ***why*** focus towards an action-oriented ***how*** focus in in sustainability education.

The Question We Care About

- How can sustainability be embedded in engineering education in a meaningful way?

Importance for our educations

- **Global Business Engineering** – the students must be able to make green business models and think they can contribute to green transition.

- Some examples of learning goals:
- Explain the broad meaning of sustainability (environmental, social and economic).
- Investigate and define a problem that has environmental implications.
- Apply entrepreneurial methods and processes to develop a sustainable business opportunity based on the defined problem.
- Design an economical sustainable business model for the business opportunity, describe its elements and justify the choice.
- Argue for the sustainability of the business.
- Pitch a business opportunity in two minutes.
- Document a business opportunity in a business plan.

Inspiration – Thoughts on sustainability in education

- What is sustainability?
  - System thinking
  - Tripple bottomline
  - SDG
- Sector dependent how sustainability is adressed
- Multi leveled discussion

Sustainability Lerning Outcomes

1. **Systems thinking and organizing complexity.** Students should have a grounded understanding of sustainability and how systems are interrelated. Students should be able to use systems thinking for research and for practical problem-solving.
2. **Interdisciplinary collaboration and integration.** Students should have experience with multiple disciplines and show the capability to work productively and effectively within cross-disciplinary teams.
3. **21st century national and international challenges**. Students should demonstrate a capacity to address 21st century national and international environmental as well as cultural challenges.
4. **Current local and regional resilience challenges.** Students should develop the means to indicate how sustainability issues are impacting their immediate social, economic, and political environment.
5. **Civic engagement and community partnership.** Students should recognize and advocate for civic engagement and inclusive practices for applying sustainability principles to local issues.
6. **Personal agency and professional responsibility.** Students should learn ethical principles of sustainability and how they are connected to practical issues of social justice, and environmental-economic equity.
7. **Information competency**. Students should develop proficiency in finding and using reliable data and documentation for support of their sustainability projects.

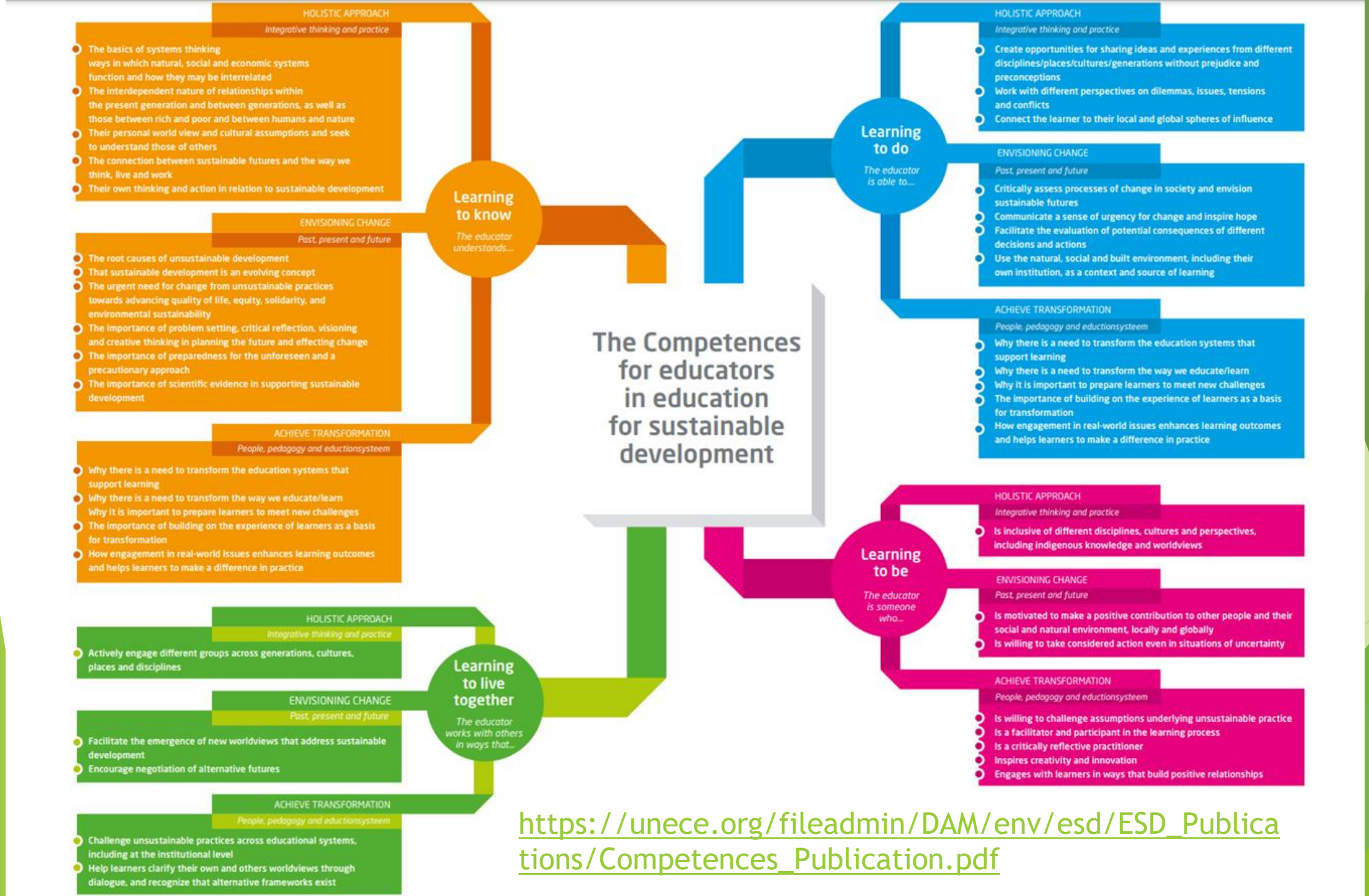
https://www.umass.edu/ses/education/undergraduate-programs/sustainability-learning-outcomes

Sustainability-focused learning outcomes:

- Students will be able to define sustainability and identify major sustainability challenges.
- Students will have an understanding of the carrying capacity of ecosystems as related to providing for human needs.
- Students will be able to apply concepts of sustainable development to address sustainability challenges in a global context.
- Students will identify, act on, and evaluate their professional and personal actions with the knowledge and appreciation of interconnections among economic, environmental, and social perspectives.

Sustainability-supportive learning outcomes:

- Students will be able to demonstrate an understanding of the nature of systems.
- Students will have an understanding of their social responsibility as future professionals and citizens.
- Students will be able to accommodate individual differences in their decisions and actions and be able to negotiate across these differences.
- Students will be able to analyze power, structures of inequality, and social systems that govern individual and communal life.
- Students will be able to recognize the global implications of their actions.



https://unece.org/fileadmin/DAM/env/esd/ESD_Publications/Competences_Publication.pdf

Hands on session- part A

- To identify how sustainability is relevant in your education.
  - 10 minutes for individual reflection on:

  How is sustainability relevant in our field of education?

  What type of sustainable thinking could resonate with our students?

  (Q1 on handout- we would like to collet handouts after the session, please)

  - 10 minutes for group discussion

(You will be asked to share your considerations in plenum)

Hands on session- part B

- To choose a learning design to work with and identify where and how sustainability can be activated in your course.
  - 10 minutes individual reflection own learning designs (Q2-4 on Hand-out)
  - Q2: What LO can promote sustainable thinking and action?
  - Q3: Good rolemodels?
  - Q4: Main barriers to embedding sustainability?
  - 20 minutes for group discussion:
    - What are the challenges and what are the benefits of embedding sustainability into educational designs?

Furthermore, each group should prepare a short presentation to present at the plenum part at the end of the hands-on session.

Discussion & Evaluation

- Challenges and benefits?
- What kind of knowledge is needed?
- When do we know it is sustainable enough?

References

Løje, H. & Lindahl Thomassen, M., (2020). The influence of the sustainability agenda on learning objectives in innovation courses for engineering students? Proceedings of the 48th SEFI Annual Conference 2020, pages: 1346-1353. Presented at 48th Annual Conference, Enschede, the Netherlands 20 – 24 September 2020

Thank You for Your attention