Outline and objectives

- Reflections
- Teaching methods
  Break
- Teaching method examples
  Break
- Working on your course

Intended learning outcomes of the session

After this (and next week’s) session you should be able to

- Design learning activities for integration of sustainability relevant themes in courses
- Apply and evaluate teaching methods for sustainability integration in own course
## Timeline of the course (changes possible)

<table>
<thead>
<tr>
<th>Reading task for respective week</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
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</thead>
<tbody>
<tr>
<td>Tejedor et al Video</td>
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<tr>
<td>Reading task Shephard &amp; Egan 2018</td>
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<tr>
<td>Reading task (tbc)</td>
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</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>Task</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.-15.4.</td>
<td>Discussion with student (book time slot in time)</td>
</tr>
<tr>
<td>18.4.</td>
<td>19.4. Homework from session 3</td>
</tr>
<tr>
<td>20.4.</td>
<td>21.4. 22.4. Session 4: Teaching methods</td>
</tr>
<tr>
<td>25.4.</td>
<td>26.4. 27.4. 28.4. 29.4.</td>
</tr>
<tr>
<td>2.5.</td>
<td>3.5. SULITEST Homework from session 4</td>
</tr>
<tr>
<td>4.5.</td>
<td>5.5. 6.5. Session 5: Teaching and assessment methods Values in teaching</td>
</tr>
<tr>
<td>9.5.</td>
<td>10.5. 11.5. 12.5. 13.5.</td>
</tr>
<tr>
<td>16.5.</td>
<td>17.5. Homework from session 5</td>
</tr>
<tr>
<td>18.5.</td>
<td>19.5. 20.5. Session 6: Dealing with emotions and anxiety Closing</td>
</tr>
<tr>
<td></td>
<td>Deadline of final reflection:</td>
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<tr>
<td></td>
<td>COURSE SESSION, at 12-15 EET</td>
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<tr>
<td></td>
<td>READING TASKS (due before contact sessions)</td>
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<tr>
<td></td>
<td>Home work assignment DLs</td>
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<tr>
<td></td>
<td>OTHER ASSIGNMENT</td>
</tr>
</tbody>
</table>
# Meeting with a student - reflections

<table>
<thead>
<tr>
<th>General guidelines:</th>
<th>Topic of discussion:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Breakout rooms: 5+5 min</strong></td>
<td>➢ What was the key finding or insight from your discussion with the student?</td>
</tr>
<tr>
<td>• &quot;Speed Dating&quot;</td>
<td>➢ Share ONE key finding or insight with your pair.</td>
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<tr>
<td>• In pairs, 5 mins each</td>
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<tr>
<td>• 2 rounds</td>
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</tbody>
</table>
Home assignments, student views

• Student view depends on who you ask:
  - Even contradictory views on the same course/programme (too little vs. too much / ignorance)
  - Students also see solutions needed in sustainable development in varying ways

• Most say sustainability is too superficially discussed (not feel competent in applying it)
• Sometimes overlapping content in different courses (e.g. on SDGs)
• Imbalance between the sustainability aspects (emphasis on environmental and/or social)

In addition, from earlier reflections:
• Unintended outcomes of learning activities, e.g. guilt, anxiety among students

"Honest teaching about where are the worst issues in our field right now, what has been done so far and what needs to be done"
Learning objectives in sustainability education

Sustainability education: Head, hands, heart (knowing, doing, being)

Sustainability competencies are:
• Interplay of knowledge, capacities and skills, motives and affective dispositions
• Developed by the learners themselves during action, on the basis of experience and reflection.

UNESCO 2017: Learning objectives for the SDGs

→ Teaching methods ought to develop students’ thinking and recognition of own capabilities; A “linear continuum of development tasks” insufficient

(Savickas 2007; Sipos et al. 2008)
Pedagogical approaches

• Supporting personal development
• Supporting capability of connecting complex and interdisciplinary problem solving to sustainability challenges
  → addressing individual as a whole

→ Combining different types of learning activities (methods) essential, if aiming at improving all the spheres, the “what, how and why”. This includes:

• Basic sustainability literacy; knowledge of ”world current situation”
• Learning about disciplinary connections, solutions and impact assessment
• Active learning, participatory methods and engagement in communities
• Group and individual reflection (on context, tools and self)
• Research approach (critical evaluation of sources and knowledge, data analysis, drawing conclusions, argumentation)

(Segalas et al. 2009; Tejedor et al. 2019)
Developing a learning activity

“What are the course learning outcomes?”

- Linkage to one or several?
- No linkage

“What are your “degrees of freedom”?”

- Time available
- Collaborators
- Feedback to students
- Assessment
- Own resources

“What is the learning goal of the activity?”

- What / Knowledge (Sustainability literacy, disciplinary)
- How / Skills (disciplinary methods and tools)
- How and Why (Key competencies)

“What methods would be possible?”

1. Passive
   With some activating elements
2. Active:
   Research, PBL, Simulation (games, roleplays), Community-connected, Inter-/transdisciplinary …

“Common feature of engaging sustainability education: teacher has a tutor / facilitator role!”

“The choice of pedagogical approach depends on the pedagogical and educational goals and the specifics of the situation (regarding students, teachers, or the learning environment)”

(Lozano et al. 2019)
Your turn: collecting learning experiences / teaching methods

Step 1: In Flinga

→ Write down any good learning/teaching experiences for sustainability related competences or content, that you have had (either as learner or teacher): **What teaching method was used? Describe briefly.**

Step 2: Still in the same Flinga

→ Let’s organize our notes according to key competences (drag to appropriate field), choose the main competence addressed, or copy the note to multiple competences

→ Change the colour of your note according to (main) sustainability dimension addressed: environmental (green), economic (red), social (orange), impossible to say (grey)
Break
10 minutes
Examples of integration with varying pedagogical approaches

1. Assignment contextualized in sustainability (pre-task video)
2. Using the SDGs to integrate sustainability content
3. Sessions and exercises developed and piloted in Aalto
   - Qualitative LCA and expert panel to integrate sustainability
   - Exercise based on qualitative LCA and systems thinking
4. Applying ready-made teaching material: literacy test and (board) games
Example 1: Assignment contextualized in sustainability

- Focus and learning objectives outside of sustainability scope
- Context of exercise / assignment around a chosen sustainability theme
- E.g. calculations,…

A. Your pre-task: Video presentation by Tomi Kauppinen, Head of Aalto Online Learning
Example 2: SDGs in teaching
ELEC-E8124 Intelligent buildings (Jaakko Ketomäki)

1. Pre-lesson task: familiarization with SDGs, video in Youtube

2. Discussion: Which of the sustainability goals are connected to buildings? Why?

3. Joint collection of relevant sustainability entry points (box on the right)

4. Student group work: How can intelligency of the buildings support achieving the sustainability goals? (next slide)
How can intelligency of the buildings support achieving the sustainability goals? Which of them?

(Group work for students)

Examples:

**Demand response**
- Cut the energy peaks

**Wise use of heat pumps**
- Management of temperatures with low temperature heating networks

**Utilisation rate**
- Efficient use of buildings

**Intermittent heating**
- Adjustment of internal temperatures as a function of presence/no presence

**Circular economy**
- Wise use of materials

**Reducing CO₂**
- Building phase, use phase and demolition

**Waste management**

**Optimizing traveling**
- Also time saving and organizing life
Examples of integration with varying pedagogical approaches

1. Assignment contextualized in sustainability (pre-task video)

2. Using the SDGs to integrate sustainability content

3. Sessions and exercises developed and piloted in Aalto
   - Qualitative LCA and expert panel to integrate sustainability
   - Exercise supporting systems thinking

4. Applying ready-made teaching material
   - Sustainability literacy test and
   - Board games
   - Climate University courses
<table>
<thead>
<tr>
<th>Course level &amp; size</th>
<th>Sustainbility-related ILOs</th>
<th>Assessment</th>
<th>Teaching activity developed</th>
<th>Student engagement</th>
<th>Approach</th>
<th>Topic addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>BA 1st year, ~200</td>
<td>Yes</td>
<td>No</td>
<td>90 min integrative and interactive lecture + stakeholder panel</td>
<td>Passive with some group/pair discussions</td>
<td>Content: Basic knowledge on discipline-specific sustainability challenges &amp; solutions</td>
<td>Impact through qualitative LCA (circular economy)</td>
</tr>
<tr>
<td>BA 1st year, ~200</td>
<td>No</td>
<td>Yes</td>
<td>Oral, in groups 90 min integrative and interactive lecture + group reflection as homework</td>
<td>Passive with some group/pair discussions &amp; reflective homework</td>
<td>Content &amp; competencies: Basic knowledge on discipline-specific sustainability challenges &amp; solutions</td>
<td>Impact through qualitative LCA, emphasizing waste management</td>
</tr>
<tr>
<td>MA, ~20</td>
<td>Yes</td>
<td>Yes</td>
<td>Sustainability-oriented group project + 45min lecture + group home assignment on systems thinking</td>
<td>Active, research-based, problem-solving</td>
<td>Competencies: systems and values thinking, interpersonal, problem solving</td>
<td>Project impact through sustainability science and LCA frameworks</td>
</tr>
<tr>
<td>MA, 10-20</td>
<td>Yes</td>
<td>Yes</td>
<td>Sustainability-oriented group project + debate</td>
<td>Active, research-based, problem-solving</td>
<td>Competencies: systems and values thinking, interpersonal, intrapersonal</td>
<td>Competencies</td>
</tr>
</tbody>
</table>
Elina Kähkönen,
University Lecturer
A! Co-Educator Team / Aaltonaut

- Two examples of sustainability integration for mass courses
Project course: Technological innovation project (Chem)

1. Pre-assignment: reflection on definitions and dimensions of sustainability, identification of sustainability connections of project

2. Lecture about
   • Basics of sustainability with activating tasks
   • Impact, systemic approach

3. Group assignment: Visualize the sustainability impact of your project
   • Template (use voluntary), free format reporting (visuals)

4. Group presentations → feedback → option for revision → part of final reporting of the project work
INSTRUCTIONS: This table can be used for inspiration and practical help when starting to draw your mind maps (or similar visualisations on your project's impact on sustainability).

How to use the table? You can e.g. first simply identify and list the process life cycle phases that are applicable to your project (the first column). Then you can start mapping your project phases against the different sustainability aspects: does our project have any impact on the sustainability aspect in question - write the impact into the right cell. After mapping, start differentiating between positive and negative impacts (or neutral), long-term and short-term effects and finally, identifying connections and possible trade-offs between different sustainability aspects. You can e.g. use colours and other tools to indicate, if an impact is positive or negative, long-term or short-term, local, regional or global. Use your imagination!

Remember that these various sustainability aspects in the table are examples drawn from scientific research (PB and doughnut models) - you don't need to use them all! You can also get inspiration e.g. from the SDGs when identifying the sustainability impacts of your projects. However, be prepared to justify and elaborate on the impacts and the connections and trade-offs you identify and present in the visualisation. In this elaboration, it is recommendable to use at least some existing framework or model of classifying the concept of sustainability.

<table>
<thead>
<tr>
<th>Process phases (following “basic” product life cycle)</th>
<th>Ecological (according to the Planetary Boundaries)</th>
<th>Economic</th>
<th>Social (according to the Doughnut model)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Land use/ conversion</td>
<td>Climate change/Energy</td>
<td>Biodiversity</td>
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<tr>
<td></td>
<td>Resource acquisition</td>
<td></td>
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<td></td>
<td>Transport</td>
<td></td>
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<td></td>
<td>Processing</td>
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<tr>
<td></td>
<td>Use phase (e.g. by business sector, user behavior ...)</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>End of use / recycling</td>
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<tr>
<td></td>
<td>Other?</td>
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</tr>
</tbody>
</table>
Examples of integration with varying pedagogical approaches

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   • Sustainability literacy test and
   • Board games
   • Climate University courses
Sustainability Literacy Test

Background
• Since 2013 (after Rio+20)
• Co-creation of questions
• Almost 50 countries
• > 430 universities
• > 45000 students

About
• 30 international questions (randomly drawn from a large pool of questions)
• Additional set of 10-20 questions
  • SDGs, national questions …
• Multiple-choice
• Educative: right answer with references provided after answering
Sulitest pros and cons

• Ready-made questions addressing sustainability from many aspects
• Increases students’ awareness
• Inspires creating various types of assignments around it
• Reference data from thousands of other students
• Possibility of conducting research with it
• Free to use for universities

• Takes time to familiarize with it
• Students need to register in order to take the test
• May be difficult to link the wide-ranging topics with own subject area
• Questions cannot be chosen by teacher, but are randomly drawn to each test session
• Comparison between test sessions difficult for the same reason

Board games in sustainability education

Based on flipped classroom and active learning

Improve sustainability competencies:
Strategic, system’s, values thinking
Inter-/intrapersonal competencies

Include varying topics:
Climate change / fact knowledge
Polarity thinking
Debating / argumentation
Critical minerals
Tragedy of the commons
Ecosystem dynamics
SDGs

Boardgames we have in Aalto:

Images: snowflakeeducation.com
Dilemma, played as a part of course work (3-step flipped classroom)

2.5 days structure with pre-assignments, game seminar and follow-up task

PROs

• Ready-made, but editable material and learning outcomes make it easy to start designing your teaching
• Easy to add content you wish to emphasize / relevant to your field
• Possibility to embed the game platform (Snowflake) in MyCourses makes it smooth for students to use
• Students found it engaging, educative and fun way to learn

CONs

• Takes time to familiarize with the concept and the material
• Snowflake is a startup – access to the material is behind licenses

Invitation:
After work game exploration
Fri 6.5. at 16->
A Blanc/Taproom
Summary: ready-made material

There is plenty of ready-made (online) games and other teaching material

- If you know some good ones, please share your sources and experiences!
- Always some effort needs to be put on learning and evaluating the material

Other ready-made material:
- En-ROADS (climateinteractive.org)
- Climate Puzzle - D-mat
- Climate university (see below)

Bachelor’s level
- CIRCULAR.NOW
- CLIMATE.NOW
- SUSTAINABLE.NOW
- AALTO
- PHYS-E0580

Master’s level
- SYSTEMSCCHANGE.NOW
- AALTO
- MS-E2136
- SOLUTIONS.NOW
- LEADERSHIP FOR SUSTAINABLE CHANGE

Additional
- CLIMATECOMMS.NOW
- STATISTICAL TOOLS FOR CLIMATE AND ATMOSPHERIC SCIENCE
- LUKIOLAISEN ILMASTON NYT
Break
### Small group discussion

**General guidelines:**

**Breakout room: 20 min**
- Field specific group of three
- Room chair: First in alphabetic (first name)
- *Complement Flinga based on your discussion*
- Be prepared for a joint discussion (10 min)

**Topic of discussion:**

As a group
- Choose one method (from Flinga or examples) that you discuss in further detail (see also Meeri’s slide).
- What kind of learning goals (what, how, why) does it support?
- What are the pros and cons of the method for you as teacher?
- What feedback mechanisms could be involved?
Homework: Work on either 1A or 1B

1A: Describe one teaching method / learning activity aiming at advancing learning of sustainability competencies or sustainability related content *that you have (successfully) used in your teaching before*. Be as precise as possible. Explicate, what was the aim of the activity and how was it concretely designed (f2f, online, timing, instructions, equipment,…). Reflect on it, e.g. how could you develop it further, for what kind of situations could you recommend this exercise, are there any critical points, etc.

1B: Based on the previous session, design one teaching activity for sustainability integration (sustainability competencies or sustainability related content) for your own course. Be as precise as possible. Explicate, what is the aim of the activity and how would you concretely design it (f2f /online, timing, preparations, instructions, equipment,…).

Both tasks: Apart from your individual submission, summarize your description into one .ppt-slide, which you share in the MyCourses Discussion forum. Make sure someone from “outside” understands your method. The submission in the Discussion Forum are visible for everyone. Comment / ask a question concerning the posted one-slider of at least one peer.
Next session in two weeks...

1. Assignment 4 (dl 3.5.)
   a) Description + reflection of existing teaching method/learning activity learning
   OR
   b) Designing a new teaching activity for your course

   AND
   ➢ Share with others as one .ppt-slide

2. Take the Sulitest, dl 5.5.

3. Reading task: Shephard & Egan 2018
Literature


UNESCO (2017): Education for Sustainable Development Goals: learning objectives; 2017 (unesco.de)
# Course alignment check

<table>
<thead>
<tr>
<th>Teaching method</th>
<th>Learning activity</th>
<th>Assessment (scale, who assesses, formative/summative assessment, emphasis on the final grade …)</th>
<th>Feedback to students (who provides feedback, feedback on the process or the end product …)</th>
<th>Feedback to the teacher</th>
</tr>
</thead>
<tbody>
<tr>
<td>ILO 1</td>
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<td>ILO 2</td>
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<td>ILO 3</td>
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<td>ILO 4</td>
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<td>ILO 5</td>
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<td>ILO 6</td>
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</tbody>
</table>
Sulitest

➢ What are your thoughts on the usefulness of this tool?

➢ In what kind of situations would you consider using it?

• Write your spontaneous comments in the chat – 3 min!
Two ways to approach sustainability in teaching (from session 2)

Solution focused approach
Focuses on field specific sustainability solutions.
Analysis of the impacts of providing services or products. (e.g. life cycle analysis, SDG based analysis)

Systemic change approach
Focuses on transition management.
Applies transdisciplinary approach

These two approaches should interact, and graduates need competencies on both approaches.

Applied from Mulder (2017)
<table>
<thead>
<tr>
<th>Reading task for respective week</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
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<tbody>
<tr>
<td>1 Pre-assignment (questionnaire)</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td></td>
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<tr>
<td>Wals et al 2014 OR own choice</td>
<td>8</td>
<td>9</td>
<td>10</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>Wiek et al 2011</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td>18</td>
<td>19</td>
</tr>
<tr>
<td>Tejedor et al 2019 Video (10 min)</td>
<td>22</td>
<td>23</td>
<td>24</td>
<td>25</td>
<td>26</td>
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<td>31</td>
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</table>

**COURSE SESSION**, at 12-15 EET

**READING TASKS** (due before contact sessions)

**LEARNING LOG DLs**

**OTHER ASSIGNMENT**
# Timeline for the course - April

<table>
<thead>
<tr>
<th>Reading task for respective week</th>
<th>Mon</th>
<th>Tue</th>
<th>Wed</th>
<th>Thu</th>
<th>Fri</th>
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<td>30</td>
<td>31</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Redman (2020) Optional: Cebrián (2019)</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Log (from session 4)</td>
<td></td>
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<td>Log (from session 5)</td>
<td></td>
<td>Session 5: Teaching methods and assessment</td>
</tr>
<tr>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td></td>
<td>16</td>
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<tr>
<td>Coffee break discussion with colleague, book time slot in advance</td>
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<td></td>
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<tr>
<td>19</td>
<td>20</td>
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</tbody>
</table>

**COURSE SESSION,** at 12-15 EET

**READING TASKS** (due before contact sessions)

**LEARNING LOG DLs**

**OTHER ASSIGNMENT**
Learning domains, sustainability education & pedagogy 1/2

Starting point: Good quality higher education

Teaching: Socio-constructivist
Learning: Deep / active
Assessment: Formative / qualitative
Impact: Personal development

Approaches of sustainability education

Teaching: ❖ Encounter ❖ Apply & create
Learning: ❖ Acknowledging ❖ Transformative
Impact: ❖ Standalone solutions ❖ Systemic change

Increasing integration of all psychological & learning domains
Through reflective practices, active learning and social engagement

Pedagogical / didactic approaches

Biggs & Tang (2011), Dlouhá et al. (2019)
Learning domains, sustainability education & pedagogy 2/2

Good quality higher education

Teaching: Socio-constructivist
Learning: Deep / active
Assessment: Formative / qualitative
Impact: Personal development

Approaches of sustainability education

Teaching:
- Encounter
- Acknowledging
- Standalone solutions

Learning:
- FEEDS
  - Apply & create
  - Transformative
  - Systemic change

Impact:
- Personal development

Increasing integration of all psychological & learning domains
Through reflective practices, active learning and social engagement

Pedagogical / didactic approaches (*specific to sustainability competencies)

- Lecturing
- Case presentation /studies
- Concept maps
- Contextualized assignments
- Flipped learning
- Inter- /transdisciplinary teamwork*
- Jigsaw/ other interlinked teamwork*

- Essays
- Simulations: games, role-play*
- Place-based learning*
- Problem-based & project-oriented learning*
- Service learning / community-based learning*
- Eco-justice and/or ecological education*

Higher education in general

Teaching: Behaviorist  Socio-constructivist
Learning: Surface/passive  Deep/active
Assessment: Summative/quantitative  Formative/qualitative
Impact: Instrumental  Personal development

Sustainability education

Teaching: Encounter  Critical reflection
Learning: Acknowledging  Transformative
Impact: Standalone solutions  Systemic change

COGNITIVE (knowledge/what)  PSYCHOMOTOR (skills/how)  AFFECTIVE + CONATIVE (attitude/why)

Application of all learning domains

Pedagogical / didactic approaches

Biggs & Tang (2011), Dlouhá et al. (2019)
Keskustelu, työskentely

Mihin kurssisi sijoittuu lähestymistapojen kirjossa? Oman ryhmän keskustelu, XX min, purku logiin

Opetusmenetelmät: mikä on mahdollinen omalla kurssilla (ja miksi?),

Learning: mistä opetusmenetelmästä haluaisit lisää tietoa (note to self)

Template, jonka kanssa työskennellään

ILO/what does the student learn?