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# Serious Games as a Pedagogical Approach

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TEACHING FOR SUSTAINABILITY | 21 NOVEMBER 2023



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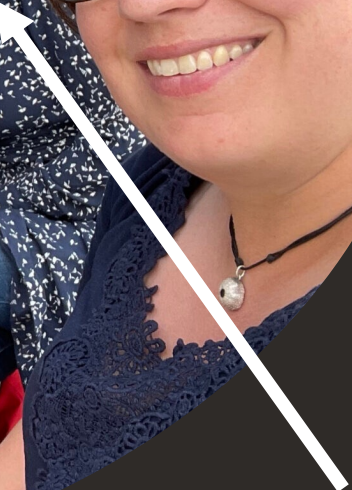
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# Agenda (10:15-12:00)

- Experiencing a Serious Game
- Reflection
- Fika
- Some theory
- Transfer & Planning





# ICEBREAKER

What is your favorite meal? How many ecosystems are involved?

# Biodiversity collage starters

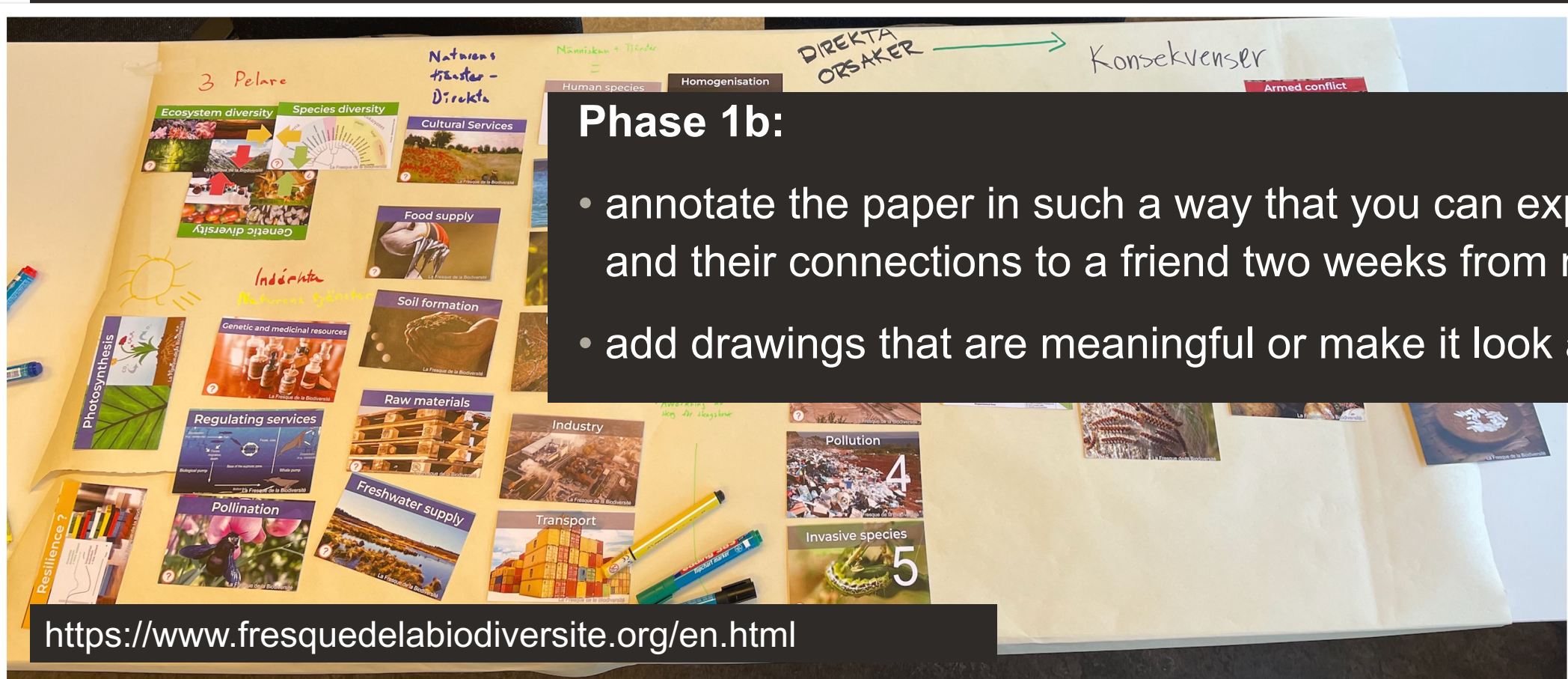


# Biodiversity collage

Phase 0a: Creating community (e.g. icebreaker!)

Phase 0b: Sparking interest (starters)

Phase 1a: collaboratively organize a growing deck of cards: what does biodiversity depend on, how do we as humans make use of it in different ways, how do our actions put pressures on the system, and what consequences those pressures ultimately lead to.



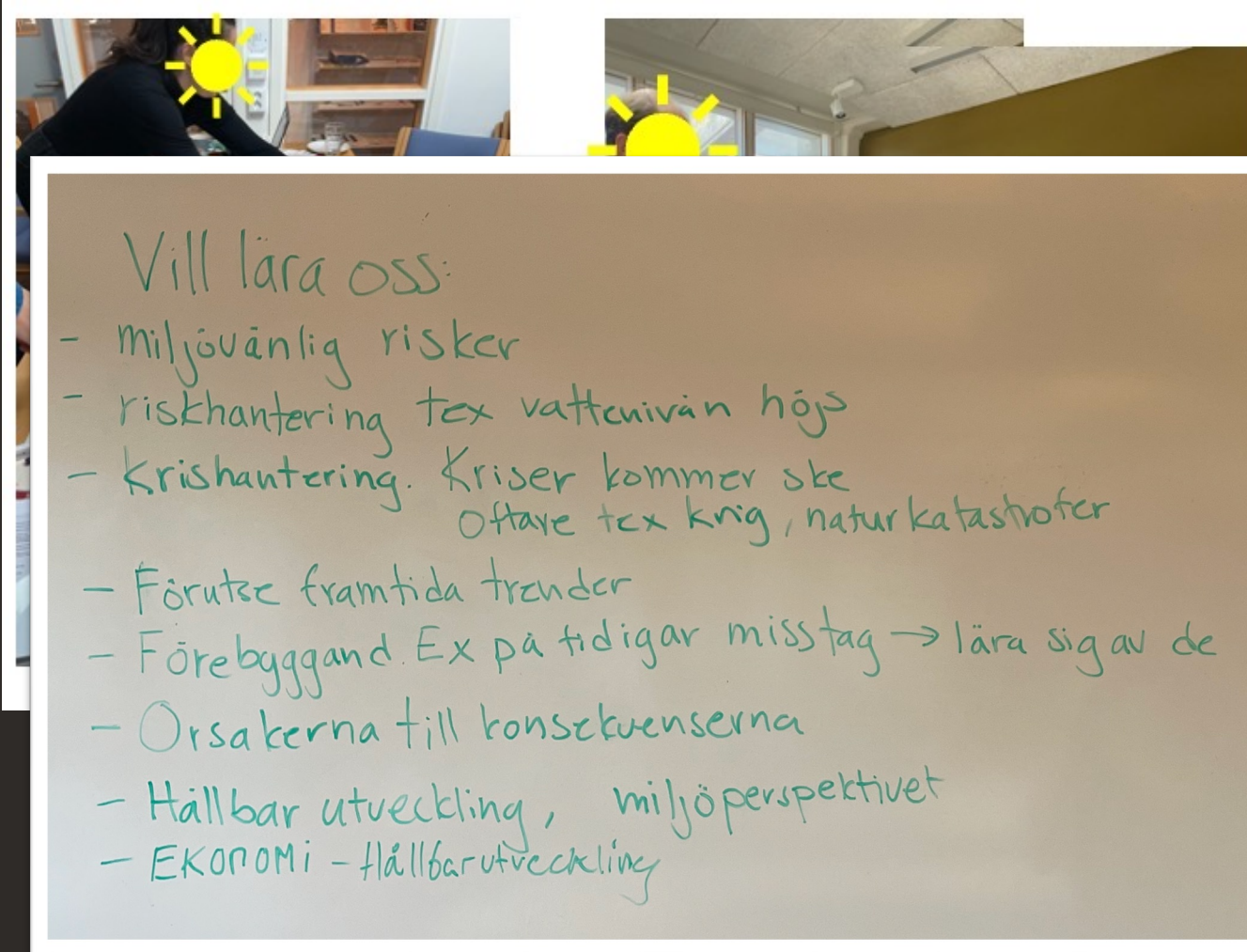
## Phase 1b:

- annotate the paper in such a way that you can explain the cards and their connections to a friend two weeks from now
- add drawings that are meaningful or make it look appealing

<https://www.fresquedelabiodiversite.org/en.html>

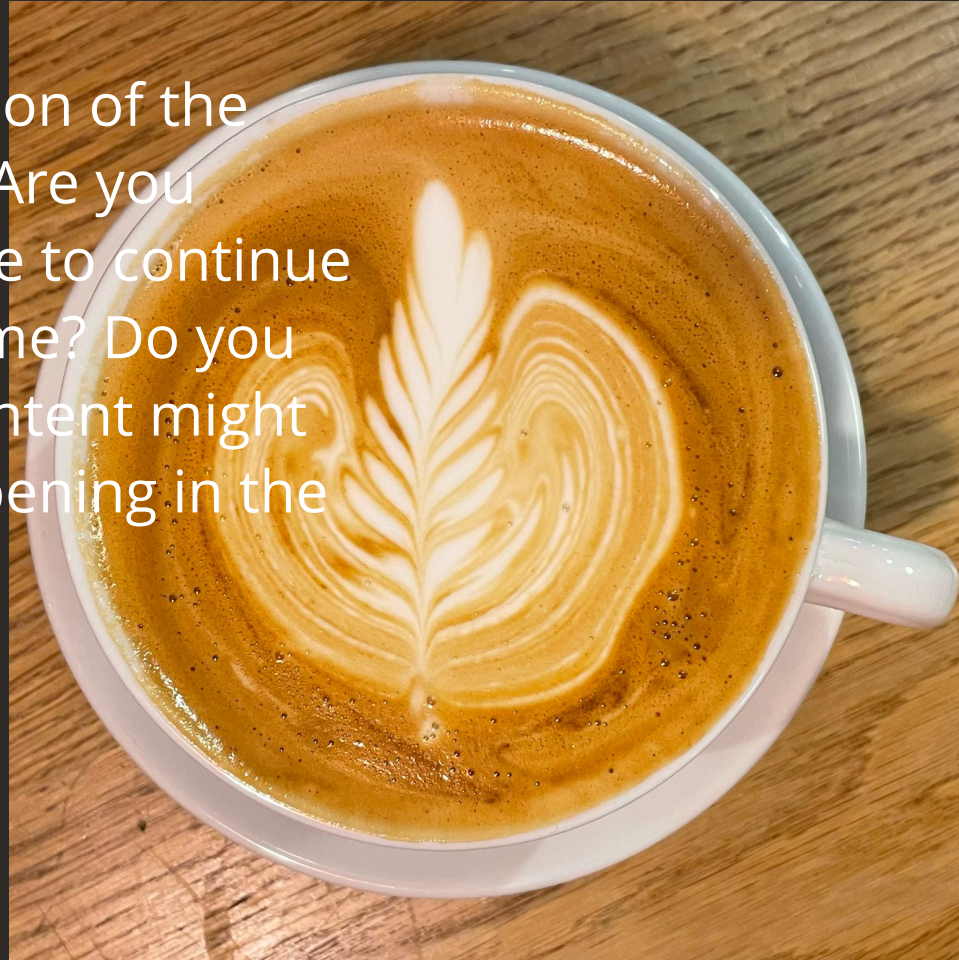
# Biodiversity collage

- **Phase 0:** create atmosphere for learning
- **Phase 1a:** collaboratively organize cards
- **Phase 1b:** annotate
- **Phase 2:** Debrief emotions experienced during and after the first phase.
- **Phase 3:** Coming into action. What can we do alone or collectively?



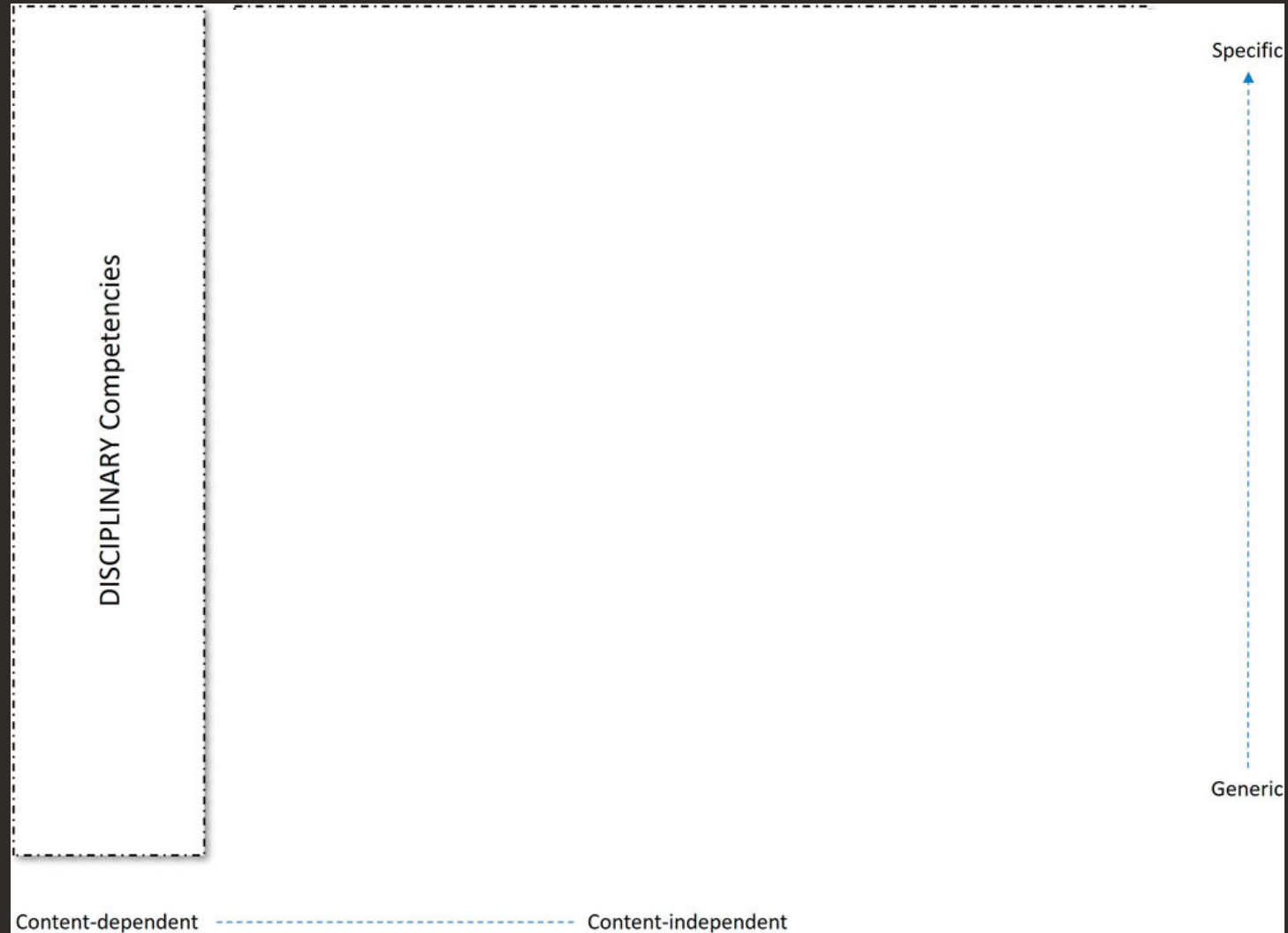
# Time for Fika!

What is your impression of the Biodiversity Collage? Are you curious and would like to continue playing the whole game? Do you see how your own content might relate to what is happening in the Biodiversity Collage?





# Key competencies in sustainability



# Serious Games in Teaching Sustainability

Encyclopedia of Sustainability in Higher Education:

*“...those games that are designed with a purpose that goes beyond pure entertainment. These games are intended to convey ideas and values, facilitate learning, and practice skills. They have the purpose of influencing thoughts and actions in real-life contexts, therefore exceeding the scope of the game itself”*  
(Ouariachi et al., 2019)

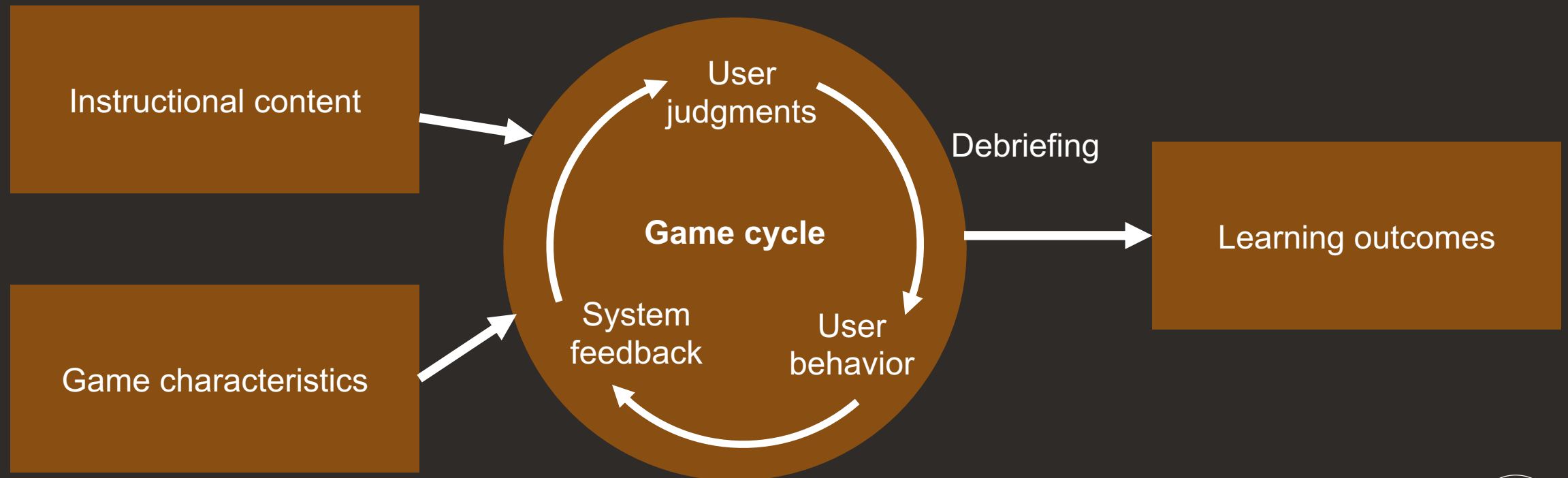


# Games, motivation, and learning

Input

Process

Output

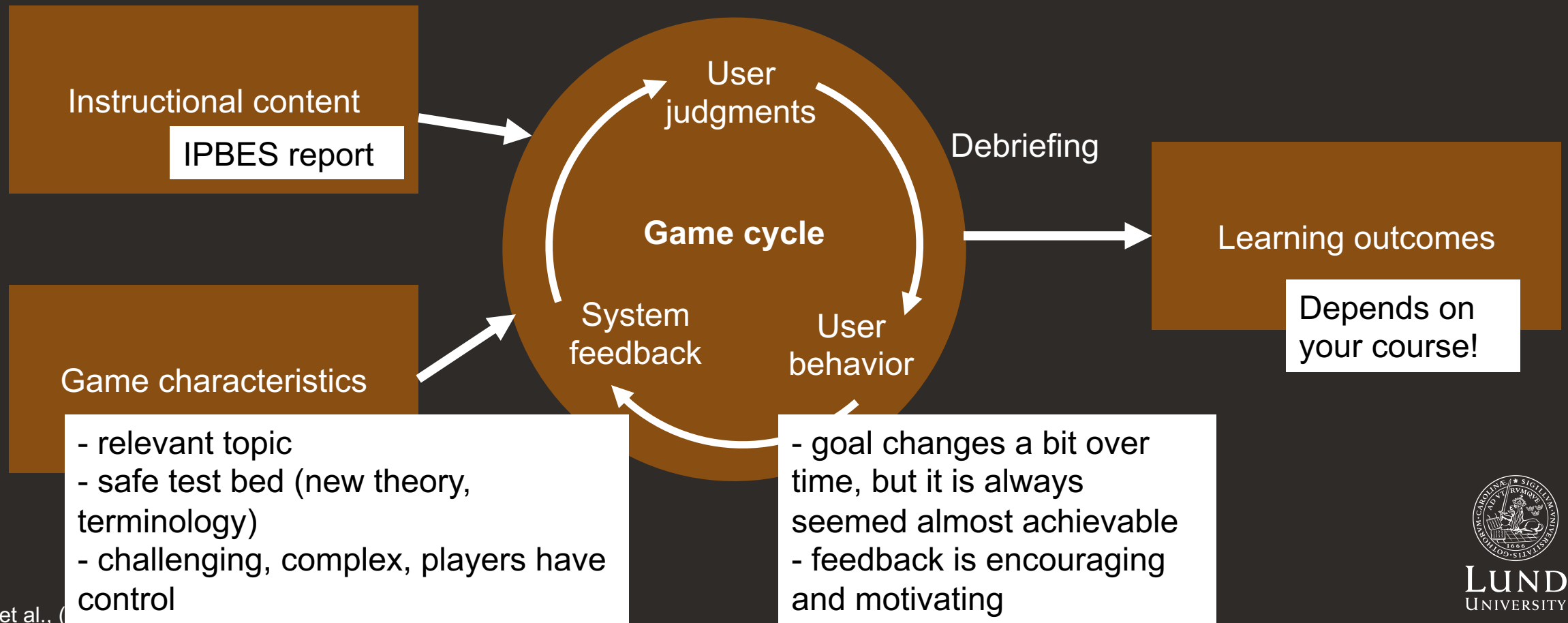


# Biodiversity Collage in this model

Input

Process

Output



3 Pelare

Naturens  
tjänster -  
Direkta

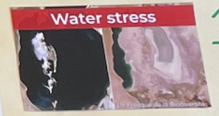
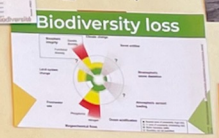
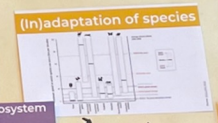
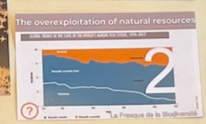
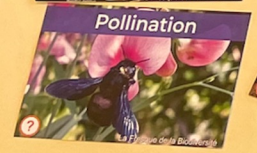
Människan + Tjänster  
=

DIREKTA  
ORSAKER

Konsekvenser



Indirekta  
Naturtjänster



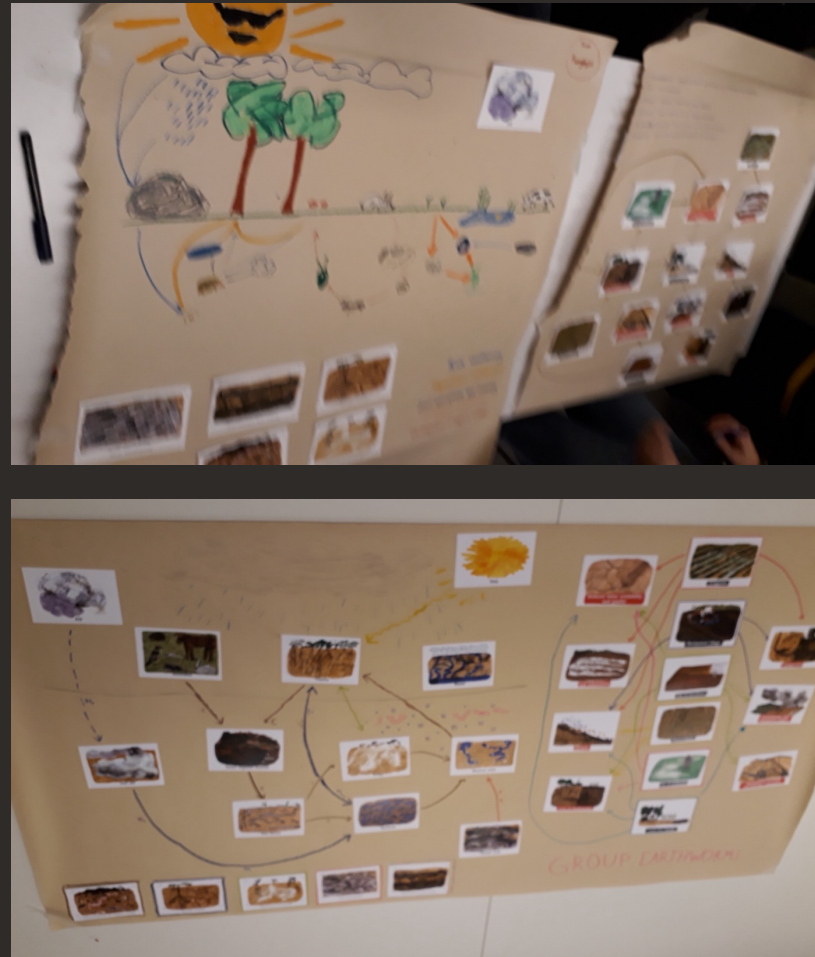
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# Other serious games

## Climate Fresk



## Living Soil workshop



## Digital Collage



### Other similar games

- New narratives
- Construction and built environment
- Mobility and transports
- Circular economy
- Low-techs
- Vulnerability and adaptation etc.



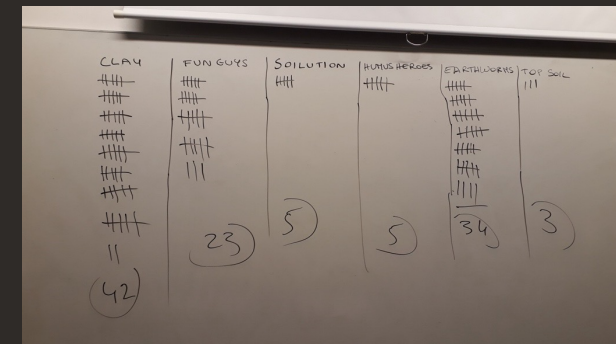
# In practice

- One teacher can handle 2 tables (16 students)
  - Involve other students as teaching assistants.
    - Creates a community of students, many are eager to be involved
  - Train colleagues before-hand and have them help
- Use existing games or create your own
  - Some of them have CC license on the cards
  - But the heart/hand can be adapted
  - Our colleague created her own version of Climate Fresk
- Several ways for the reflection & action parts
  - Brainstorm on collective, individual, political, business actions
  - Impact vs Effort matrix
  - Role-play
  - Course-specific activity (e.g. Risk management)



# The Living Soil Workshop

- Groundwater Engineering course, master level
  - Help from two colleagues
- Learning outcomes
  - Carbon and nitrogen cycles, organic versus mineral, redox state
  - Decomposition of organic matter, role of bacteria
  - Rock weathering and ions
- Role-play
  - Farmer versus politician, teacher vs businessman etc.
  - Interesting for emphasizing the importance of democratic space
- Contest about the most pedagogic collage
  - used for the rest of the course





# The Climate Fresk (first year students)

« The different systems that relate to each other is something that I learned from playing the game. Especially the reactions that accelerate each other over and over again. »

“It was fun and extremely informative. Made me realise that we have to do something now and not wait around for someone else to take action.”

“I learned a lot, especially about the connections between different causes and consequences. There were many steps that I have not connected before.”

“I have learned the importance of the climate and what it could lead to if we don't act. In my everyday life I will start valuing what's worth doing to reduce the emissions.”



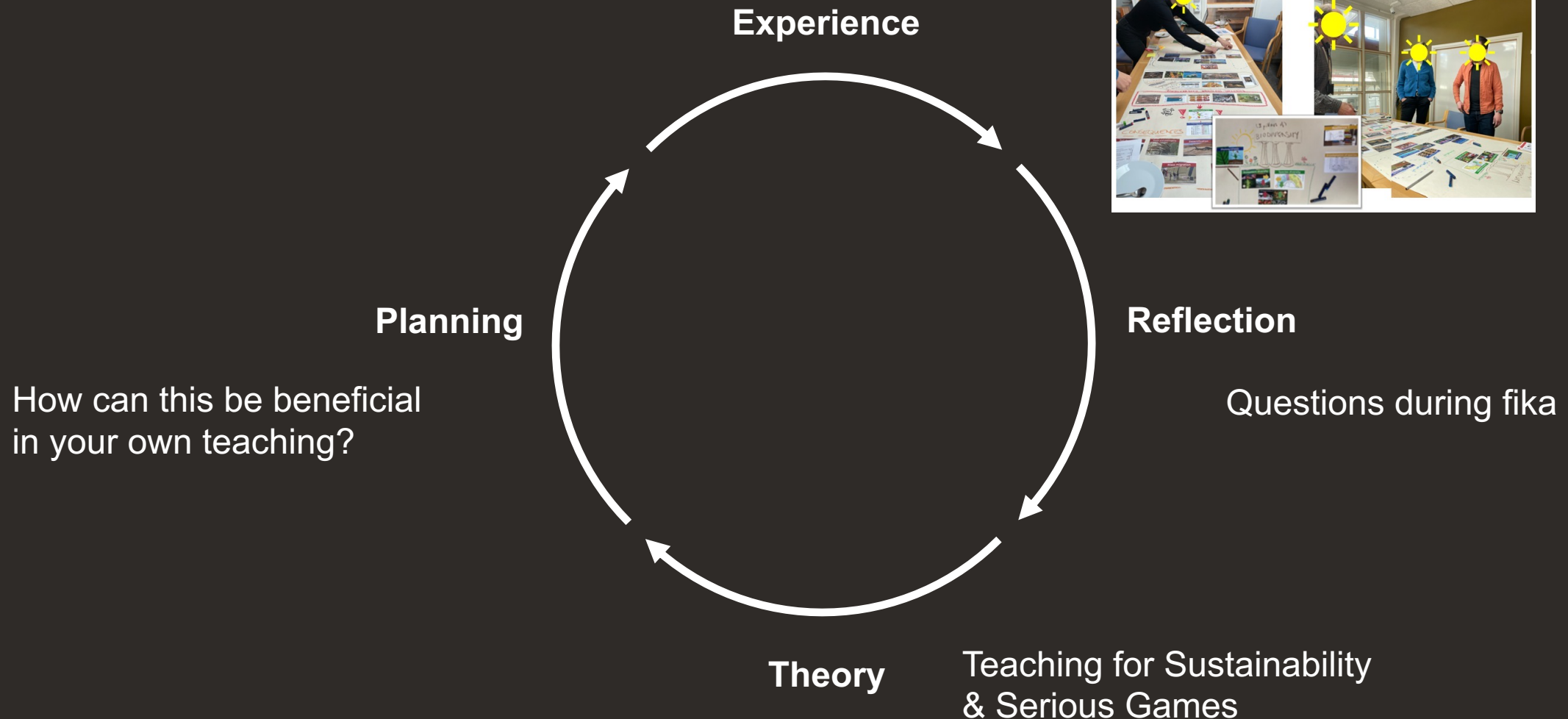
# And do they work?

It depends...

- on the game
- on the implementation
- on the learning outcomes
- on the context
- ...



# What works: Experiential learning cycle



E.g. Kolb (1984), Bergsteiner et al. (2010)

# What works: Engage head, hand, heart

## Head

Intellectual aspects

Bring cards in the right order

## Heart

Emotional aspects

Articulate emotions, build community

## Hand

Practical & solution oriented

Think about next steps



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# Hope dies, action begins?

**Constructive hope:** “a form of hope fostering long-term, proactive environmental engagement at the collective (e.g. political engagement, participation in social movements, organizational change) and individual (e.g. lifestyle choices, individual actions) level”

- **Goal setting:** supported by peer reflections on practical things students can do to make a change, and how local change can contribute to global change
- **Pathway thinking:** trust in teachers, humanity, NGOs, ...
- **Agency thinking:** integration of university with “real world”, discussions of responsibilities, alignment between values and actions
- **Emotional reinforcement:** students become aware of their emotions and the effects they have on their well-being, and learn coping strategies

# Build your own game

- **Identify the main learning objective** of the game
- **Iterate** on game design: Share the idea, do a test run, get feedback each time
- It does not all have to be perfect – **use teaching time to put game into context**: What was realistic, what was not? Why?
- **Share** for others to build their own
- [https://bit.ly/innovation\\_game](https://bit.ly/innovation_game)



Discuss at your table:

How many of you can think of a course where this is interesting to implement?

What course? What learning outcomes? Which game?

What do you need support with?

Brainstorm to support each other!





Join at [menti.com](https://menti.com) use code 2511 9585



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# Resources for teachers at LU

- Website:  
<https://www.ahu.lu.se/en/resources/teaching-for-sustainability/>
- Course “Integrating Sustainability Competencies in Curriculum (ISCC)” (deadline to apply 28 November)
- Course “Higher Education Didactics for Sustainability (HEDS)” (deadline to apply 1 December)
- Course (only LTH) “Teaching sustainability” (deadline to apply 20 February)
- TEAMS “Community of Practice (TfS)” (you are welcome to join at any time!)





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Thank You!



Redrawn after:  
Cantell, H., Toippanen, S., Aarnio-Linnanvuori, E., & Lehtonen, A. (2019). Bicycle model on climate change education: Presenting and evaluating a model. *Environmental Education Research*, 25(5), 717-731.

