Crossing2Communities

Syllabus

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Minor

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CROSSING2COMMUNITIES MINOR

NOTE TO THE BMS TEACHING ACADEMY

This syllabus is intended as an initial guideline to explain our vision of the proposed minor program. It provides an overview of the program's distinct qualities, objectives, planned learning activities and timelines. Our long-term goal is to remain flexible and offer multiple pathways to access such education. Hence, we propose to offer this program, first, as minor program, but later explore opportunities to turn part of it into a summer course.

INTRODUCTION

The Crossing2Communities program aims to provide foundational knowledge of sustainable development to students from diverse disciplines. It employs challenge-based learning (CBL) principles to engage students in a real-life, global challenge situated in a local environment ("glocal challenge") while paying attention to vulnerable groups. To prepare for the challenge, students acquire knowledge about sustainable development, citizen science and leadership for sustainability. The program stimulates students to acquire necessary analytical skills while building competences to address societal challenges (e.g., systems thinking, anticipatory thinking). Afterwards, split in interdisciplinary groups, students engage in real-life learning working together with vulnerable groups and external stakeholders in local society to understand their problems and co-develop innovative and sustainable solutions. The challenge selected for the academic year 2022/23 include energy (e.g., energy poverty), waste (e.g., food waste), sustainable consumption and production (e.g., fast fashion). In addition to the CBL approach, the program is also based on 'Education for Sustainable Development' principles.

The target audience for this program is broad, targeting students from engineering to social sciences. Contributions on design, policy interventions, the psychology of vulnerable groups, feasible business cases, communication strategies and social innovations are all highly welcomed and encouraged. At the same time, it is our intention to make this program available to a small number of citizens in the local community to exchange the flow of ideas between students and citizens.

UNIQUE SELLING POINT

Recognizing that the University of Twente already offers several education programs linked to sustainability, we want to highlight the unique qualities of this education.

Firstly, this program will be an introductory course to sustainable development, providing foundations for bringing these ideas to other courses afterwards. As it is a foundational course, we aim to make it as accessible as possible by not putting limits on minimum grade and potentially even offering it to a small number of citizens from the Twente community.

Secondly, to our knowledge, it is the first CBL minor at the University of Twente rooted in Education for Sustainable Development (ESD) principles. ESD is a holistic learning approach advocated by the UNESCO that *'empowers learners to make informed decisions and responsible actions for environmental integrity, economic viability and a just society, for present and future generations while respecting cultural diversity'*.[1] As such, it

[1] Leicht, A., Heiss, J., & Byun, W. J. (2018). *Issues and trends in education for sustainable development* (Vol. 5). UNESCO Publishing. https://unesdoc.unesco.org/ark:/48223/pf0000261445?posInSet=2&queryId=0e820ffd-1069-4eaa-b8a9-e2c50bfdcb6b

addresses all three dimensions of sustainable development – environmental, social, and economic. ESD, first institutionalised in 1992, is now recognised in the Paris agreement and incorporated in Agenda 2030 Sustainable Development Goals (SDGs)[2]. Our proposed program addresses all eight key competences identified as part of the Education for Sustainable Development framework (e.g., systems thinking, integrated-problem solving, anticipatory-thinking, self-reflection) and reflects the key principles.

Thirdly, our skills sessions focus on developing group dynamics and leadership skills for sustainability. The sessions focus on developing collaborative and inclusive style of working, leading and problem solving with strong emphasis on self-reflection.

ENTRY REQUIREMENTS

The program is available to all bachelor students at the University of Twente and/or from ECIU partner universities. ATLAS students are welcome to apply too. Besides the standard requirements, no additional requirements are set. We aim for an interdisciplinary and highly motivated classroom.

INITIAL CASE STUDY 2022

Every year the program may have different challenges, derived from the needs of socially vulnerable groups in the region surrounding the UT campus. The underlying theme each year remains sustainable development. The challenge selected for the academic year 2022/23 include energy (e.g., energy poverty), waste (e.g., food waste), sustainable consumption and production (e.g., fast fashion). After covering the theoretical foundations (e.g., systems thinking, sustainable development, citizen science), students contact people from vulnerable groups (e.g. unemployed, low-socioeconomic status, lower levels of education) and other relevant stakeholders to research what their sustainability-related needs are. Program coordinators guide students in finding the relevant contacts.

As a next step, students develop a personal learning plan (PLP) in small interdisciplinary groups, in agreement with their supervisor, on what they each need to learn to address the sustainability challenge while considering the needs of vulnerable groups. For instance, after reviewing existing knowledge and/or statistics, regional and national interventions and reflecting on how this group fits in the larger system, students conduct interviews and/or focus groups. The engagement with external stakeholders is essential to the learning experience, and especially the vulnerable communities should participate in contributing towards the final solution. Students are encouraged to reach out to other relevant stakeholders to receive feedback on their proposed solution (e.g., municipality, industry representatives). Moreover, students are asked to triangulate the data from statistical agencies and policy interventions with the insights from the vulnerable group before proposing a solution. Their final solution is presented in a short report along with a pitch presentation or a video addressed to the local community (if possible).

[2] Rieckmann, M. (2017). Education for sustainable development goals: Learning objectives. UNESCO Publishing. https://unesdoc.unesco.org/ark:/48223/pf0000247444

ELECTIVE'S OBJECTIVES

This section provides an overview of the program's learning objectives. The X2C's objectives are aligned with Education for Sustainable Development (ESD) eight key competences. ESD is holistic and transformational education recognised in Sustainable Development Goals.[3] ESD competences are marked with an asterisk:

1. **SYSTEMS THINKING*:** The course aims to introduce students to systems thinking concepts. By the end of the course, students should be able to identify and describe various systems, analyse relationships among actors within the systems, explain interdependences and propose interventions. Such a competency is highly relevant as the world has become increasingly complex and globalised and systems are heavily interconnected and dependent upon each other. Solutions to societal, business, or environmental problems need to consider such complexities, such as building the necessary adaptative capacity into social, technical, or ecological systems considering the complex overarching challenge posed by the climate- and ecological crises.

2. **SUSTAINABLE DEVELOPMENT:** Students will be introduced to the concept of sustainable development and its multiple dimensions. As part of the course, they will learn about sustainable development policies and interventions over time and will take part in a debate discussing sustainable development interventions. This goal contributes to ESD critical thinking competency*.

3. **EXPLORATORY DATA ANALYSIS AND DATA VISUALISATIONS:** By employing inquiry-based learning, students will be introduced to publicly available statistical data available via the World Bank, OECD, UN, and EC databases, next to those of national, regional, and local provenance (e.g., CBS, Kennispunt Twente, Enschede municipality). They will explore data visualisations to identify trends and insights. This goal contributes to ESD critical thinking competency*.

4. **POLICY LEVERS:** Students will learn about policy tools used to stimulate desirable actions or mitigate adverse effects (e.g., capacity tools, incentive tools, regulatory mechanisms). They will identify tools used in a case study, and discuss the advantages, complexities and possible (unintended) adverse effects of using these tools. We will discuss why engaging citizens in decision-making process may lead to better outcomes. This objective contributes to the ESD anticipatory competency by understanding how the use of policy levers can impact sustainable development outcomes*.

5. **CITIZEN SCIENCE & PARTICIPATORY ACTION RESEARCH:** After the theoretical part on citizen science and other relevant themes, students will work together with citizens of Twente region to define research questions, identify key challenges, collectively formulate problems, design solutions, and engage in feedback exchange. As part of a case study, students are encouraged to select a specific vulnerable group (e.g., homeless, unemployed, service-workers, migrants, or a low-income neighbourhood). Community members also participate in the learning process. This objective contributes to the ESD normative competency* as students become familiar with the norms of values of an external group, and discuss solutions and trade-offs for sustainable addressing societal problems in a sustainable and inclusive manner. . In the process, students will discover that many challenges involve 'wicked problems' in the sense that the definition of the problem and acceptable solutions are inherently contested among stakeholders.

6. **INCLUSIVE LEADERSHIP:** As part of program's skills sessions, students will learn about group dynamics, inclusive leadership styles and resolving conflicts. Afterwards, students will apply this knowledge while

[3] SDG 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[…]"

solving their selected sustainability challenge. This objective contributes to the ESD strategic and normative competencies*.

7. **INTEGRATED PROBLEM-SOLVING COMPETENCY*:** As part of their case study on vulnerable groups, students will be asked to integrate their previous knowledge in their final report, looking at local and international statistical data and public reports, available policy interventions in Enschede and the Netherlands, and triangulate this data with the insights obtained from the citizens. They will then propose a sustainable and inclusive solution to a local challenge.

8. **SELF-AWARENESS COMPETENCY*:** At the end of the course, students are asked to reflect on their learning experience, interaction with the vulnerable group and how their own personal experience has shaped their learning and conclusions. This should be conducted according to the three levels of action research reflection: 1st, 2nd, and 3rd person action research practice (individual, group, and organisation accordingly) where possible.

9. **COLLABORATION COMPETENCY*:** creative thinking (in groups), communication with peers and external stakeholders, organisation of group work, planning and implementation of the proposed solution in partnership with the community, vulnerable group, and other external stakeholders.

LEARNING TRAJECTORY OF COURSE: OBJECTIVES, ACTIVITIES AND ASSESSMENT

This section provides an overview of the learning objectives, linked learning activities, and intended assessment method. Such a course design is rooted in the principles of constructive alignment, ensuring that learning objectives are well-aligned with the class activities, homework and assessments. The learning trajectory outline below is set up based on the constructive alignment approach. The key feature of the constructive alignment approach is the idea that learning objectives should align with learning activities and assesment. As such, it helps to ensure quality learning experience.

	Learning Objective	*Activities*	*Assessment*
What is at stake (week 1 & 2)	*<u>Content:</u>* *Sustainable development – fundamentals* *(i) understand the principles of sustainable development, cover 3 dimensions* *(ii) understand the consequences of not following these principles* *<u>Competences:</u>* *Anticipatory thinking (ESD),* *(iii) Reflect on scenario analysis* *Self-awareness (ESD)* *(iv) identify and reflect on one's own existing knowledge and knowledge gaps with respect to SD.*	*<u>Class activities:</u>* ***Scenario analysis** (hopeful future and dreadful future, similar to the Carbon Literacy course)* ***Roles & Group Processes**: Extended empathy for vulnerable groups, conflict resolution tools.* *<u>Homework:</u>* ***Reflection paper:** reflect on future scenarios (300 words), areas of existing knowledge and knowledge gaps (300 words).*	*Reflection paper after the first class, 10%*
Skills session # 1: ***Ice-breaking***	*<u>Content:</u>* *Sustainable development – fundamentals* • *Learn about one topic of sustainable development from the movie* *<u>Competences:</u>* *Self-awareness (ESD)* • *Get to know each other, understand how one's unique experiences relate to others*	*<u>Class activities:</u>* ***Movie night:** Watch and critically discuss the movie in own time per group – helps to build the group for later* ***Ice-breaking activity:** everyone gets to know each other's background (education, interests, hobbies), which will be important for the next skills session.*	*Attendance (2%, 5 skills sessions together contribute to 10% of the grade)*
Societal challenges & systems thinking (week 3 & 4)	*<u>Content:</u>* *(v) Understand why systems thinking is important with respect to sustainable development* *(vi) Understand the discrepancy between economic system and environmental system* *<u>Competences:</u>* *Systems thinking (ESD)* *(vii) Be able to explain a system and its interdependencies*	*<u>Class activities:</u>* **Group discussion** on systems, identifying a challenge for the poster (week 5) ***Presenting a poster** (week 6)* *(groups can present the systems from three dimensions considered in SD – economic, environmental, social/political, discuss interdependencies and the conflict)* *<u>Homework:</u>* ***Creating a poster** illustrating how a system works (e.g., applied to local community) (between week 5-6)*	*A poster presentation: 10%*
Skills session # 2: ***Team building***	*<u>Content:</u>* • *Understand how group dynamics work* *<u>Competences:</u>*	*<u>Class activities:</u>* ***Group activity:** Carry out group exercise, reflect on group dynamics* ***Reflection:** Understand how group*	

	Collaboration (ESD) • *Carry out group exercise, reflect on group dynamics*	*dynamics work by covering* *(1) Group Development Process* *(2) Frames* *(3) Group Work in Practice: Brainstorming*	
Policy levers and their failures (week 5 & 6)	*Content:* *(viii) Policies for sustainable development and climate change* *(ix) Policy levers utilized for change (frameworks)* *(x) Data sources available for policy making* *(xi) Limitations of politicians & policy making* *(xii) Role of grassroots movements in policy change* *Competences:* *Strategic competency (ESD)* *(xiii) Prioritizing climate solutions and policies (debate)* *Normative competency (ESD)* *(xiv) Negotiating values and priorities in policy making process (debate)*	*Class activities:* ***Debate:** Simulating a parliament debating on climate policies* ***Database search:** Research OECD, WHO, UN and other reliable data sources for relevant climate change indicators* *Homework:* ***Policy analysis paper**: Analyze one policy, explain which levers are used, support it with data from international databases*	*Policy analysis (20%)*
Skills session # 3: ***Leadership & Agency for Systemic Change***	*Content:* • *Understand different styles of leadership, their strengths and limitations in promoting sustainability transformations* *Competences:* *Normative competency (ESD)* • *Discuss how different leadership styles can be of value in various contexts, reflect within group which style they prefer and would like to embrace*	*Class activities:* **Discussion:** Discuss leadership for sustainable development, including conflict resolving, empathy, group dynamics. Cover the following leadership styles: (1) Social Identity Approach to Leadership (2) Transformational Leadership (3) Inter-Group Conflict (Resolution) (4) Empathy Creation	
Citizen inclusion in a challenge-based setting (Week 7 & 8)	*Content:* *(xv) Learn about citizen science & social entrepreneurship* *Competences:* *Critical thinking (ESD)* *(xvi) Identify a specific challenge in a local community & why it is a challenge*	*Class activities:* ***Roleplay:** Mimic how to work with divisive and opinionated groups? E.g. meat-eaters and vegan.What does it mean to get to know a vulnerable group in the Netherlands?* **Case study:** *Reading a short piece on Citizens Assemblies and discuss it in class*	

Skills session # 4: Inclusive Leadership & Empowering vulnerable groups	*Content:* • *Learn how different leadership styles can help to empower vulnerable groups often left out from high-level decisions* *Competences:* *Normative competency (ESD)* • *Discuss how inclusive are different leadership styles, which styles are better suited to empower vulnerable groups*	*Class activities:* **Discussion:** Discuss leadership for empowering vulnerable groups, learning to empathize with vulnerable groups **Practice active listening:** *Socio-emotional awareness of communities, to create relatability.* *Tools: Active Listening*	
Challenge-oriented research methods (Week 9 & 10)	*Content:* *(xvii) Learn about relevant research methods* *Competences:* *Integrated problem solving (ESD)* *(i) Identify a research method to the selected challenge*	*Class activities:* ***Independent group work on the challenge**, but tutors & teachers available for consultation* *Homework:* ***Interview/survey citizens** or run a focus group* ***Report** on the methods and research outcomes*	
Skills session # 5: Conflict resolution & Resilience	*Content:* • *Understand why conflicts occur, how conflicts can be anticipated, managed* • *Learn about various approaches to cope with stress and use resilience tools (e.g., mindfulness)* *Competences:* *Collaboration (ESD)* • *Discuss a complex conflict (case study) and reflect on conflicts witnessed in recent past* *Anticipatory competence (ESD)* • *Discuss how to anticipate conflicts and prepare for mitigation strategies*	*Class activities:* ***Case study:** Discuss a conflict resolution in a complex case study, including vulnerable groups.* *Discussion: After case study discuss conflicts experienced or witnessed, and how they might have been solved better* ***Learn to see other's perspective:** Learn to understand the conflict from the perspective of the vulnerable groups, only then use conflict resolution tools.* ***Share good practices:** Students make a board with good practices for increasing their own resilience*	
Working out the challenge with citizens	*Content:* *(ii) Learn about specific challenge in a local context* *Competences:* *Integrated problem solving (ESD)* *(iii) Identify a solution to the selected challenge considering three dimensions of SD, + technological*	*Class activities:* ***Independent group work on the challenge**, but tutors & teachers available for consultation* *Homework:* ***Write the final report** - integrate solutions with the research findings*	*Final report, integrating solutions with research findings* *Up to 50%*

ALIGNMENT BETWEEN OBJECTIVES, ACTIVITIES AND ASSESSMENT

To ensure that the course attains its learning objectives, and that assessment is fair, we align the learning objectives with relevant activities and grades. Students are graded on four assignments (90%) as well as active participation in the skills sessions (10%). Out of four assignments, three are groups works (poster presentation (10%), policy paper (20%), integrated final report (50%)) and one is an individual assignment (reflection paper (10%). Each assignment is linked to one or more learning objectives. The integrated final report, worth 50% of the total grade, should provide students with the freedom to drive their own learning experience from deciding on the specific challenge to proposing the final solution.

OVERVIEW OF COURSE SCHEDULE

The total minor program is 15 ECTS. The core course will last 10 weeks, and is awarded 5 ECTS. This includes lectures, homework, and assessments. In the CBL part of the course (10 ECTS), running in tandem, interdisciplinary student groups will work together on a regional sustainability challenge of their choice, informed by a set of broader sustainability challenges that we outlined. They will have skills seminars here as well as group sessions, together and also under tutor supervision.

CORE COURSE (5 ECTS)

Week 1 and 2: What is at stake – climate, ecological, and biodiversity crises

Description

In Weeks 1 and 2, we seek to convey to students what is at stake. We aim to equip them with a foundation knowledge with which to understand the cascades of climate and ecological damage that human activities have created over the past century and more. By giving an overview of the status of our climate, ecology and biodiversity, students can understand the scale of the overall challenge of sustainable development. The consequences depicted would be grouped along various scenarios such as 'business as usual', 1.5 degrees, 2 degrees. We classify impacts to society accordingly and supplement the content by an interactive activity on future scenario analysis. In the first skills session, students engage in ice-breaking activities as the foundation for effective team building.

Literature

Key book

- Wallace-Wells, D. (2019). *The Uninhabitable Earth: A Story of the Future*. USA, Tom Duggan Books, Penguin Random House.
    - Part I. Cascades pp. 1-36
    - Part II. Elements of chaos, pp. 37-140

Other possible sources

- Rockström, J. and Gaffney, O. (2021). *Breaking boundaries: The science of our planet*. 'Introduction' (pp. 12-17) and 'Planetary boundaries' (pp. 74-88) + some more
- Dessler, A., & Parson, E. (2019). The Science and Politics of Global Climate Change: A Guide to the Debate (3rd ed.). Cambridge: Cambridge University Press. doi:10.1017/9781316832158
    - Chapter 1 – Global Climate Change: A New Type of Environmental Problem pp. 1-34

- Kolbert, E. (2014). *The sixth extinction: An unnatural history*. A&C Black.
    - Select chapters.
- Ceballos, G., Ehrlich, P. R., & Raven, P. H. (2020). Vertebrates on the brink as indicators of biological annihilation and the sixth mass extinction. *Proceedings of the National Academy of Sciences*, *117*(24), 13596-13602
    - Short Article of Ceballos et al (2020) above on Earth.org
- Ceballos, G., Ehrlich, P. R., Barnosky, A. D., García, A., Pringle, R. M., & Palmer, T. M. (2015). Accelerated modern human–induced species losses: Entering the sixth mass extinction. *Science advances*, *1*(5), e1400253

Week 3 and 4: Societal challenges & systems thinking

Description

In weeks 3 and 4 we bring in literature on cases of socio-ecological system management. The aim is (1) to give the students the basis of understanding and evaluating social and ecological systems from multiple disciplines and (2) enable them to map how these systems are interrelated. For instance: How does ecosystem damage in a river delta affect agricultural production, and how is the biodiversity in turn affected by industrial farming? Students learn and read several of these cases to help them chose a local challenge that they model and map in smaller groups to understand the interdependency and interconnections at play in such a system. The students work on a poster presentation that conveys a sustainability challenge and how it relates to a larger system.

Literature

Key articles

- Meadows, D. *Leverage Points: Places to Intervene in a System*. The Sustainability Institute, Paper 2000
- Westley, F., et al. (2013). "A Theory of Transformative Agency in Linked Social-Ecological Systems." Ecology and Society **18**(3).
- Westley, F., et al. (2011). "Tipping Toward Sustainability: Emerging Pathways of Transformation." Ambio 40(7): 762-780.
- Clifton, D. (2010). "Progressing a Sustainable World: A Socio-Ecological Resilience Perspective." Journal of Sustainable Development **3**(4).

Other possible sources

- Schaffer, D. and D. Vollmer (2010). Pathways to Urban Sustainability: Research and Development on Urban Systems; Summary of a Workshop. Committee on the Challenge of Developing Sustainable Urban Systems, Washington D.C., The National Academies Press.

Week 5 and 6: What we can do and why it has not happened yet

Description

In weeks 5 and 6, we zoom out from local cases to the political and economic system in which they are embedded. We emphasize the various solutions that already exist to address the most fundamental challenges that humanity has faced so far. But the overall policy failure, over the past four decades, to tackle the climate and ecological crises also leads us to the cultural, economic and technological characteristics of our current system. The content is supplemented by a debate on sustainable development policies and a first peek into (inter)national statistical databases in order to more critically analyze problems.

Literature

Key book

- Hickel, J. (2020) *Less is more: How degrowth will save the world*. London: Penguin

Other possible sources

- Wallace-Wells, D. (2019). The Uninhabitable Earth: A Story of the Future. USA, Tom Duggan Books, Penguin Random House.
    - Part III. The Climate Kaleidoscope.
        - Storytelling pp. 143-157 & The Church of Techology pp. 171-184
- Hickel (2015) Why the new sustainable development goals won't make the world a fairer place.
- Timothée Parrique. The political economy of degrowth. Economics and Finance. Stockholms universitet, 2019. English. ffNNT : 2019CLFAD003ff. fftel-02499463 Chertkovskaya, E., Paulsson, A., & Barca, S. (Eds.). (2019). *Towards a political economy of degrowth*. Rowman & Littlefield. https://rowman.com/ISBN/9781786608956/Towards-a-Political-Economy-of-Degrowth
- Short video on demistifying degrowth: https://rosalux.nyc/demystifying-degrowth-animated-video/
- Rich, N. (2020) *Losing earth: The decade we could have stopped climate change.* New York Picardor- Selected pages.
    - also: the 2018 NY Times article should be sufficient to convey core message to students
- The EU's 'Green Deal'. Pp. 24
    - Topics: Risks and opportunities of AI in the planned transformation envisaged in the Green Deal.
- Dessler, A., & Parson, E. (2019). The Science and Politics of Global Climate Change: A Guide to the Debate (3rd ed.). The Science and Politics of Global Climate Change: A Guide to the Debate (3rd ed.). Cambridge: Cambridge University Press. doi:10.1017/9781316832158
    - Chapter 5 – Climate Change Policy: Impacts, Assessments, and Responses pp. 113-174
- Fleming, J. R. (2005). Historical perspectives on climate change. Oxford University Press. Introduction, Chapters 9-10 (pp.107-139)
- Svoboda, T., Keller, K., Goes, M., & Tuana, N. (2011). Sulfate aerosol geoengineering: The question of justice. *Public Affairs Quarterly*, *25*(3), 157-179.
- Levin, K., et al. (2012). "Overcoming the tragedy of super wicked problems: constraining our future selves to ameliorate global climate change." Policy Sciences 45: 123-152.
- MacKinnon, D. and K. Driscoll Derickson (2012). "From resilience to resourcefulness : A critique of resilience policy and activism." Progress in Human Geography: 1-18.

Week 7 and 8: Citizen inclusion in challenge-based projects

Challenging the unsustainable system we all live in is arguably an inherent part of work that strives to make our world more livable, equitable and sustainable. But how to include people, instead of pushing them away, in a societal transformation that will require substantial changes from all of us? We focus on various ways in which citizens can be included in sustainable development such as the entrepreneurial inclusion of citizens (social entrepreneurship), the academic inclusion of citizens (citizen science) and the political inclusion of citizens (citizen assemblies). In two skills sessions, we focus on leadership for change and inclusive leadership, identifying the role of citizens in driving change for sustainability.

Key articles and books on social entrepreneurship

- Zahra, S. A., et al. (2009). "A typology of social entrepreneurs: Motives, search processes and ethical challenges." Journal of Business Venturing **24**(5): 519-532.

- Cunha, J., Benneworth, P., & Oliveira, P. (2015). Social entrepreneurship and social innovation: A conceptual distinction. In *Handbook of research on global competitive advantage through innovation and entrepreneurship* (pp. 616-639). IGI Global.
- Smith, B. R. and C. E. Stevens (2010). "Different types of social entrepreneurship: The role of geography and embeddedness on the measurement and scaling of social value." Entrepreneurship and Regional Development **22**(6): 575-598.
- Martin, R. L., & Osberg, S. (2015). *Getting beyond better: How social entrepreneurship works*. Harvard Business Review Press.
- Elkington, J. and P. Hartigan (2008). The power of unreasonable people: How social entrepreneurs create markets that change the world, Harvard Business Press.
    - Economist summary/review
    - Video: https://iop.harvard.edu/forum/power-unreasonable-people-how-social-entrepreneures-are-changing-world

Key articles on citizen science

- Intemann, K. (2015). Distinguishing between legitimate and illegitimate values in climate modeling. *European Journal for Philosophy of Science*, *5*(2), 217-232.

Key books and articles on citizens assemblies

- Van Reybrouck, D. (2016). *Against elections: The case for democracy*. Random House.
- Warren, M. E., & Pearse, H. (2008). Designing deliberative democracy: The British Columbia citizens' assembly.

Week 9 and 10: Quantitative and qualitative methods for action research

To include citizens in challenge-based projects comes with certain methodological requirements. We explain the very basics of the emancipatory values and tools of action research. Action research holds the potential to include vulnerable groups* as a way into the imperfect system whose flaws they experience in their daily lives as well as target groups of sustainable solutions. We will explain, in brief, which qualitative and quantitative methods of research are relevant for challenge-based action research with an emphasis on statistical data analysis, interviewing, coding, discourse analysis and triangulating data. To support the learning, students will have a skills session on conflict resolution and reflect on the means, impact and intention of the research.

Key books and articles on quantitative and qualitative (action) research

- Bradbury, H. (2015). Handbook of Action Research: Participative Inquiry and Practice 3rd Edition, SAGE Publications.
    - Introduction and selected chapters optional
- Dey, I. (1993). Qualitative Data Analysis: A User-friendly Guide for Social Scientists. Taylor & Francis e-Library 2005.

***VULNERABLE GROUPS**

We speak of 'vulnerability' as the high(er) risk of an individual, group or ecosystem to incur the negative consequences of societal developments and natural hazards. A coastal region that lies below sea level is vulnerable to flooding; a religious minority in a war zone is vulnerable to harassment or worse; an older person might be vulnerable to certain diseases or to loneliness. Vulnerable groups, in that definition, are somehow at a greater risk to health, poverty and/or exclusion due to their physical, mental, or social characteristics. In an encompassing transition to a fair and sustainable society, it is particularly important to keep the basic needs of

these groups in mind and therefore requires attention to the specific concerns they have and the forms of assistance they might need.

SUSTAINABILITY CHALLENGES (10 ECTS)

In tandem with the core course, and building upon it, students work in their interdisciplinary group. In a period of ten weeks, they engage in real-life learning working together with vulnerable groups and external stakeholders in the Twente region to understand their problems and co-develop innovative and sustainable solutions. The challenges selected for the academic year 2022/2023 relate to key areas where rapid change is necessary: (1) the energy transition, (2) more plant-based, less wasteful food practices, (3) sustainable clothing consumption and production. We have developed a template for students to work with in developing their own regional translation of the challenge. And, using the template, we have ourselves developed more specific challenges in each of these key areas: energy poverty, sustainable food practices and fast fashion. Below, we present the example of 'energy poverty' as one of the three challenges students can pick to further develop in the Twente region.

The challenge of energy poverty

Building and renovation are key sectors that the European Green Deal singles out for targeted political intervention (European Commission 2019, pp. 9-10). Two reasons stand out. First, buildings account for roughly forty percent of the energy that is consumed in the European Union overall. That energy consumption weighs heavily on the annual greenhouse gas emissions that lead to dangerous climate change. Second, member states do make an effort to improve the situation. But their current renovation rates are way too low to reach the climate- and energy efficiency objectives of the EU.

One phenomenon receives special mention by the European Commission: **energy poverty**. In one of the wealthiest parts of the world, fifty million citizens still 'struggle to keep their homes adequately warm'. What we need, according to the EC, is the engagement of the EU and the Member States in a veritable 'renovation wave' of both public and private buildings. In doing so, it is essential to organize our efforts into 'larger blocks to benefit from better financing conditions and economies of scale'. If we succeed, this renovation wave allows us to meet the challenge of quickly reducing the burning of fossil fuels while simultaneously keeping energy consumption affordable for European citizens. As such, addressing energy poverty holds great potential to solve part of the climate crisis in a quick and fair manner. But the intertwinement between normative issues and democratic, political and technological ones also makes it a very multidimensional problem.

In **normative terms**, the phenomenon of energy poverty does not affect all citizens equally. The most vulnerable often live in the houses that are not well-isolated and have little to no financial reserves to adequately address it. This raises profound normative issues of climate justice. The vulnerable groups with lower incomes contribute less to greenhouse gas emissions overall while they are most badly affected by a future rise in the prices of energy. In **democratic terms,** addressing energy poverty could secure more bottom-up support for the energy transition. When properly executed, it could lead vulnerable groups to feel that they are included in, and might even benefit from, policy interventions. When we fail to address energy poverty properly, however, it could also lead to decreased democratic support as vulnerable groups feel they are (again) left out. In **political terms**, the organization of such a renovation in larger blocks goes against strong tendencies in policymaking. The swift, block-based policy interventions could require a concerted political effort to educate people in the renovation sector and centrally manage the whole endeavor. For decades, however, policymakers have preferred market-based instruments and decentralized decision-making. In **technological** terms, the European Commission leaves open the question as to the most energy efficient way to renovate large blocks of houses. Largescale renovation could lead to a substantial reduction in energy

consumption questions about the use of resources itself with variations in availability, price, effectiveness and user friendliness.

Given the intertwinement of many issues, how could we address energy poverty in the Twente region? How can we find out, qualitatively or quantitatively, who suffers most from it? What would be needed in terms of local political support and financial investment? And what are the technological challenges of an ambitious energy poverty program?

ATTAINING CBL PRINCIPLES

The above-described case study allows the elective to follow the CBL principles. While the underlying theme for the program focuses on sustainable development, the challenges vary each year, and multiple alternatives are offered every year. For example, at least three themes will be offered in 2022/2023: energy (e.g., energy poverty), waste (e.g., food waste), sustainable consumption and production (e.g., fast fashion).] In addition, students have the freedom to select the vulnerable group, define their specific challenges and propose a unique and sustainable solution to a complex problem. During the elective students work in multi-disciplinary teams interacting with external stakeholders to propose a sustainable solution. As such, the elective fulfils the key requirements of CBL learning. Since the case study changes from a year to year, it allows to create relevant and flexible CBL experience in a long run.

OFFERING THE ELECTIVE ONLINE

If due to COVID-19 restrictions, it is necessary to offer education online, this elective can be fully offered in such a format. Online lectures will employ interactive tools and use breakout rooms facilitated by tutors who ensure that learning objectives are attained. Moreover, asynchronous forum discussions will be used to facilitate debates and could contain gamification elements. Interviews with community stakeholders will be conducted online. The final assessment of reports may be evaluated by a moderated online panel and include a proportion of the grade assessed by peers, also including real-life feedback. However, the default format is a face2face study.

RELEVANCE FOR LABOUR MARKET

While the elective aims to address societal needs, the competencies developed are transferable and relevant both in public and private sectors. Nowadays most organisations need to solve complex challenges, and solutions need to be sustainable, transformative and – wherever a social or ecological impact is aspired - rooted in the constituent system. In this elective, students acquire skills and competences to solve complex challenges through systems thinking and learn about sustainable development, policy levers, data exploration and participatory citizen science. Hence, they acquire theoretical, methodological, analytical, and creative competencies while learning in a real-life setting. Preparing the youth of today to navigate through the complexity, uncertainty and (climate) disruptions that the rest of the 21st century will entail, is at the core of our design philosophy of this elective. Beyond foundational content on sustainable development, our skills sessions help students identify their own leadership style and reflect on how to become a more inclusive sustainability leader.

APPENDIX

Below we have listed some key academic and grey literature consulted as well as the objectives of SDG 11.

A. Selection of relevant academic papers:

Barth, M., & Rieckmann, M. (2016). State of the art in research on higher education for sustainable development. *Routledge handbook of higher education for sustainable development*, 100-113.

Charosky, G., Leveratto, L., Hassi, L., Papageorgiou, K., Ramos-Castro, J., & Bragós, R. (2018, June). Challenge based education: an approach to innovation through multidisciplinary teams of students using Design Thinking. In *2018 XIII Technologies Applied to Electronics Teaching Conference (TAEE)* (pp. 1-8). IEEE.

Conde, M. Á., Rodríguez-Sedano, F. J., Fernández-Llamas, C., Gonçalves, J., Lima, J., & García-Peñalvo, F. J. (2020). Fostering STEAM through challenge-based learning, robotics, and physical devices: A systematic mapping literature review. *Computer Applications in Engineering Education*.

Edwards, D. B., Sustarsic, M., Chiba, M., McCormick, M., Goo, M., & Perriton, S. (2020). Achieving and Monitoring Education for Sustainable Development and Global Citizenship: A Systematic Review of the Literature. *Sustainability*, *12*(4), 1383.

Findler, F., Schönherr, N., Lozano, R., Reider, D., & Martinuzzi, A. (2019). The impacts of higher education institutions on sustainable development. *International Journal of Sustainability in Higher Education*.

García-Feijoo, M., Eizaguirre, A., & Rica-Aspiunza, A. (2020). Systematic Review of Sustainable-Development-Goal Deployment in Business Schools. *Sustainability*, *12*(1), 440.

Kohn Rådberg, K., Lundqvist, U., Malmqvist, J., & Hagvall Svensson, O. (2020). From CDIO to challenge-based learning experiences–expanding student learning as well as societal impact?. *European Journal of Engineering Education*, 45(1), 22-37.

Kathleen Aikens, Marcia McKenzie & Philip Vaughter (2016): Environmental and sustainability education policy research: a systematic review of methodological and thematic trends, Environmental Education Research, DOI: 10.1080/13504622.2015.1135418

Wu, Y. C. J., & Shen, J. P. (2016). Higher education for sustainable development: a systematic review. *International Journal of Sustainability in Higher Education*.

B. Selection of some relevant policy papers & white papers:

Council of the European Union. (2018). Council recommendation of 22 May 2018 on key competences for lifelong learning (text with EEA relevance). *Official Journal of the European Union 2018/C 189/01*, 1-13. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.C_.2018.189.01.0001.01.ENG&toc=OJ:C:2018:189:TOC

European Commission. (2017). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on a Renewed EU Agenda for Higher Education*. https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52017DC0247

Green Office Movement. (2020a). *Do you want to take sustainability to the next level?* . Retrieved from https://www.greenofficemovement.org/sustainability-resources/

Johnson, Laurence F.; Smith, Rachel S.; Smythe, J. Troy; Varon, Rachel K. (2009). *Challenge-Based Learning: An Approach for Our Time.* Austin, Texas: The New Media Consortium.

Leicht, A., Heiss, J., & Byun, W. J. (2018). *Issues and trends in education for sustainable development* (Vol. 5). UNESCO Publishing. https://unesdoc.unesco.org/ark:/48223/pf0000261445?posInSet=2&queryId=0e820ffd-1069-4eaa-b8a9-e2c50bfdcb6b

Mader, M., Tilbury, D., Dlouhá, J., del Álamo, J. B., Michelsen, G., Mader, C., Burandt, S., Ryan, A., Mulà, I., & Barton, A. (2014). *State of the art report: Mapping opportunities for developing Education for Sustainable Development competences in the UE4SD partner countries*. Charles University Environment Center.

Nichols, M., Cator, K., and Torres, M. (2016) *Challenge Based Learner User Guide.* Redwood City, CA: Digital Promise.

Observatory of Educational Innovation Tecnologico de Monterrey. (2015*). EduTrends: Challenge Based Learning.* Tecnologico de Monterrey

Rieckmann, M. (2017). *Education for sustainable development goals: Learning objectives*. UNESCO Publishing. https://unesdoc.unesco.org/ark:/48223/pf0000247444

Timmermans, F., & Katainen, J. (2019). Reflection Paper Towards a Sustainable Europe by 2030. *European Commission*. https://ec.europa.eu/commission/sites/beta-political/files/rp_sustainable_europe_30-01_en_web.pdf