HOW CAN WE STRENGTHEN GRADUATES' SUSTAINABILITY COMPETENCE AND MINDSET?

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OVERVIEW OF WORKSHOP

Implementing learning goals to strengthen graduates' sustainability competence and mindset is critical to meeting global sustainability challenges. The challenges are often recognised as *wicked problems*, due to their complexity in terms of conflicting goals and resistance to definition, implementation and solution. A system thinking approach is recommended to handle these challenges. Besides solid capabilities in their respective subject areas, future graduates must possess generic skills for personal development, including critical thinking, reflection, teamwork, communication, creativity, self-confidence, and independence - qualities often referred to as 21st century skills. The labour market highly values these skills, recognised as UNESCO's key competencies for lifelong learning.

Issues related to food security are prominent examples of wicked problems, such as downscaling the meat industry while maintaining food security and self-sufficiency. A food system comprises all processes along the food value chain, including primary production, food processing, distribution, trade, and consumers. Thus, issues related to food systems are complex and call for university graduates with knowledge beyond disciplinary boundaries. Students should be prepared to contribute with their expertise to interdisciplinary collaboration with representatives from other fields to solve complex challenges. This calls for re-thinking the structure of our study programs and how teaching and learning activities should be designed.

Applying food systems as an example, our team addresses an emerging need for a pedagogical framework and a toolbox on *how* to teach sustainability and *wicked problems* of high quality. We believe that elements of interdisciplinarity should be integrated into higher education, beginning with contextual learning activities at an early stage. Active and contextual learning is applied as a general pedagogical practice, encouraging students to ask critical questions and develop autonomous thinking skills.

KEYWORDS

Interdisciplinary learning, sustainability competencies, Standards: 1,2,7,8

DURATION

The workshop is scheduled for 60 minutes.

ACTIVITIES

This workshop aims to discuss best teaching practices for developing candidates' sustainability competence and mindset and build upon the discussion to develop *next* pedagogical practice in engineering and science education.

The workshop will consist of four activities:

1) The workshop facilitators will introduce the topic
2) In small groups, guided by a chair, participants will share ideas and experiences related to four major questions:
    a. How to design wicked problems and assess students' learning outcomes?
    b. How can academic teachers adapt to a new role of supervising wicked problems? What are the barriers?
    c. Attitudes towards student active learning and assessment methods – how to overcome barriers among students and staff?
    d. How can we re-think education to stimulate interdisciplinary collaboration from day one at the university? What measures can be used to engage students and staff in the co-construction of the next pedagogical practice?
3) Groups share ideas and reflect upon each other's contributions.

TARGET AUDIENCE

Academic and administrative staff and students searching for pedagogical approaches to strengthen graduates' sustainability competence and mindset are the workshop's targeted audience. Examples of wicked problems from food systems will act as a starting point for the discussions. However, we think interdisciplinary collaborative learning approaches and wicked problems are transferable among sectors, and we encourage representatives from various professional fields to participate in the workshop.

OUTCOMES

Workshop participants will explore future trends in pedagogical approaches for increased sustainability competence and mindset among graduates. Participants will get insight into overcoming barriers to applying new teaching practices. Participants will share ideas and broaden their insight into *teaching, supervising, and assessing* wicked problems.

BIOGRAPHICAL INFORMATION

Anita Nordeng Jakobsen: is an Associate Professor appointed as an excellent teaching practitioner at the Department of Biotechnology and Food Science, NTNU. Her research focus includes seafood quality, food microbiology and safety, and antibiotic resistance.

Sunniva Hoel is an Associate Professor at the Department of Biotechnology and Food Science. Her research focus includes seafood microbiology, food safety and antibiotic resistance in food production and aquatic environments.

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Magnus Strøm Kahrs is an Associate Professor in Science Education at the Department of Physics at NTNU. Between 2019 and 2021 he served as Vice Dean for professional studies at the Faculty of Natural Sciences. His research interests include collaborative learning and educational development.

Guri Sivertsen Korpås is an Assistant Professor appointed as an excellent teaching practitioner at the Department of Physics. She is involved in implementing various CDIO initiativesHer research interests include collaborative learning, new learning spaces, and formative assessment.

Jan Ola Strandhagen is a Professor at the Department of Mechanical and Industrial Engineering at NTNU. His research interests include digitalisation for increased sustainability in various industrial sectors, including the food industry.

Eirin Marie Skjøndal Bar is an Associate Professor at the Department of Biotechnology and Food Science. Her research focus is sustainable food production systems and hygienic design, and she has developed a master-level course on sustainable food production.

Ida-Johanne Jensen is an Associate Professor at the Department of Biotechnology and Food Science, and a study program leader at Food Science, Technology and Sustainability. Her research interests include industrial nutrition and food safety.

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