

Getting from *Why* to *How* in Sustainability Education

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ABSTRACT

Keywords – learning objectives, sustainability, active education for sustainable development

Please indicate clearly the type of contribution you are submitting: hands-on, explore.

Background

Higher education plays an important role in the context of sustainable development and has a significant influence on the way in which future generation of engineers will deal with the sustainable challenges (Barth *et al*, 2014). However, there is a need for a revision of engineering education to meet this call (Rubio *et al*, 2019).

So far, engineering education has achieved some milestones regarding sustainability with regards to awareness of the sustainability crisis/challenges (Guerra, 2016). But to reach further, engineering education needs to change sustainability education from a strategic *why* focus towards an action-oriented *how* focus. This entail curriculum development and implement student-centred, experiential, constructive and transformative learning pedagogies such as place-based learning, inquiry-based learning, problem based learning (PBL), discovery learning, case-based learning, conceive, design, implement, operate (CDIO) and community-based learning (Guerra, 2016).

Explanation

In a study by Løje & Thomassen (2020), it was explored how sustainability influence learning objectives in innovation and entrepreneurship education in Denmark. It was found that the main focus was on strategic management and arguing for sustainability. Very few learning objectives reflected education on how to create sustainable solutions. Perhaps this tendency is due to the high complexities regarding teaching a sustainable engineering practice. Moreover, sustainability is defined, measured and goal set in different ways. This calls for a contextualization of sustainability education, but also a practice-oriented approach to educating how-to- rather than solely focusing on why.

Gueera (2016) suggest that problem based learning (PBL) could be an answer to integrating sustainability in engineering curricula. Applying PBL as teaching methodology for undergraduate engineering courses, the students will learn how to adjust to situations and solve problems, and empower them to solve sustainability-related problems later on.

To educate the new generation of engineers with a more action-oriented approach to sustainability, we need to review and revise the focus in learning objectives and in extension educational approach. With this contribution, we wish to start a dialog about how to formulate learning objectives, which are action-oriented less focus on arguing for sustainability. We are beyond the point of arguing for the importance of sustainable solutions, we need to walk the talk and educate engineers, who can create them. But how can learning objectives be designed to reflect that and what challenges is then faced in education?

Set up Hands-on session

Introduction (10 min)

In the introduction, participants will be presented to findings regarding current sustainability learning objective in innovation and entrepreneurship courses in engineering education. Current state will be discussed including why this is relevant and which dilemmas can be identified. Then we will introduce the hands-on activities. The focus here will be to dream up future scenarios for contextualized active learning in sustainability, through the formulation of new learning objectives.

Hands-on activity (60 min)

Part A: In groups, the participants will be asked to share current practice in relation to sustainability education. They will be asked to identify current challenges, opportunities and context specific considerations. During group work, the discussion will be guided through questions and notes made in the groups in a padlet or on post-its.

Between part A and B, there will be a short plenary sum-up and introduction to formulating learning objectives.

Part B: New groups will be formed based on professional focus. Then the participants will be asked to formulate sustainable learning objectives relevant to their courses or domain expertise. These learning objectives should be contextualized and practise oriented.

At the end of the session (20 min)

At the end of the session, there will be wrap up of the group discussions by sharing examples and predicted opportunities and challenges. The authors will discuss the results of the hands-on activity and develop questions for further inquiry.

- Expected outcomes/results (possibly data/experience from own practice).

The hands-on session is designed to inspire educators to work with a contextualized activation of sustainability education through development of learning objectives. This is no easy task; we therefore also expect to identify challenges and searching for possible solutions together. From prior experience, collaborations have been established, ranging beyond the session, sparked by common interest and passion for engineering education. Finally, we expect to collect the data during the session and use them for developing a scientific journal contribution.

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