

Teaching relational understandings of sustainability in engineering education

Erik Hagelskjær Lauridsen and Ulrik Jørgensen

Aalborg University, Denmark, ehl@plan.aau.dk and uljo@plan.aau.dk

ABSTRACT

Sustainability as relational quality, sustainability as technical parameter, sustainability as disruptive challenges

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Background

Sustainability is often in engineering curricula reduced to be an immanent parameter of the choice of engineering solution and as such treated in the same manner as other characteristics like price, strength, surface quality etc. While some sustainability issues are straightforward and can be treated as immanent to a given product (fx the use of fossil fuels), many other aspects of sustainability are features of the relational context of the engineering solution. One example is that the importance of non-fossil energy consumption depends to a wide degree on the type of energy source and the availability of this source in specific locations. Another example is how the importance of material composition depends on the expected lifetime and the fate of the materials in the local end-of-life system.

Explanation

Such idealised and abstract descriptions where the contextual relations of production, use and disposal systems are omitted, lead to a fragmented understanding of actual sustainability challenges. On the positive side such parametric descriptions of sustainability issues make them comparable to other disciplines like material science, where a very extensive parameterisation already exists. Accordingly, the parametric sustainability descriptions of LCA have succeeded in developing into a well-recognized technical field, which now appears with the characteristics of an established scientific discipline. However, treating sustainability as an additional parameter, which has to be prioritized alongside other requirements, leaves little room for addressing more radical sustainability challenges.

An alternative to this is to describe the sustainability challenge as the identification of disruptive possibilities that can challenge the current unsustainable regimes of consumption and production. This paper explores how such alternative descriptions are pursued in different courses of the Sustainable Design engineering program at Aalborg University. These approaches include meta-descriptions of sustainability assessment methods, descriptions of technology as elements in socio-technical regimes, descriptions of technologies as interlinked with social practices, and descriptions of consumption dynamics through the use of business models.

Expected outcomes

The paper informs a discussion on how such contextual methods can be combined with more immanent approaches to sustainability and contributes to a further identification and qualification of the sustainability agenda as different from the conventional engineering target of improved efficiency in engineering curricula.