

Education for innovation and sustainable energy consumption

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<https://www.mentalup.co/blog/the-importance-of-education>

Motivation

- ***How to foster a sustainability innovation strategy for institutions that rises to the challenge of sustainable energy consumption?***
- Need for *sustainability innovation strategy* is obvious
 - Energy-induced greenhouse gas emissions are still too high
 - Extraction of metals are in many cases environmental disastrous and often inhuman
 - Conflicts are emerging (rapidly?)
- Education is a keystone to foster appropriate strategies

Education

- Process of (getting/receiving) systematic instruction
 - Acquiring knowledge *and* developing the powers of reasoning and judgement
 - Traditionally at schools and universities; nowadays also companies, communities, etc.
- ➔ Two challenges
- Subject of learning, e.g. sustainability energy consumption
 - Conditions to achieve the desired education targets, defined by the respective discipline

Sustainability

- “Sustainable development is [a] development that meets the needs of the present without compromising the ability of future generations to meet their own needs.”
(Report of the World Commission on Environment and Development: Our Common Future, 1987, p. 41)
- Need for a “better” definition is obvious, but could be insufficient
- Achieving sustainability is a *search* for ways to *improve the capacity*
 - to “*guide*” interactions between nature, technology, economy and society toward a more sustainable future
 - to *understand* how sustainable futures could look like

Sustainability – Education requirements

- Systematic instruction should address the dimensions of knowing
 - how to deal with the complexity of sustainability
 - how to act together across professional, social, and cultural content

Sustainability – Education requirements

- Dimensions of complexity
 - Comprehensive (i.e. *socio-economic-environmental-technological*) perspective of the respective system
 - Process of
 - identifying factors relevant for describing a possible sustainable future,
 - defining sustainability future(s), and
 - achieving a selected sustainable futurein a dynamic world
- Necessity for acting together
 - Sustainability
 - is the *outcome of societal mediation*
 - considering the findings of indicator-based assessments
 - Selecting ways and means of achieving sustainability should be the *outcome of societal mediation*

Sustainability energy consumption

- Conceptually no clear answer possible
 - Relevant (socio-economic-technological) system?
 - Relevant region? (Burden shifting!)
 - Relevant stakeholder?
- In practise
 - climate-neutral technologies plus
 - techno-economic efficiency/competitiveness (of these technologies)
(often ignoring up-stream impacts)

Educate sustainability energy consumption – at Universities

- Relevant for “all” faculties
- Curriculum should address
 - an comprehensive approach, i.e. *socio-economic-environmental-technological* perspective on energy consumption
 - Socio – is more than acceptance; also participation, culture
 - Economic – is more than costs; also behavior, attitudes
 - Environment – is more than greenhouse gas emissions; also e.g. eutrophication, nutrient balances
 - interdisciplinarity – to learn the complexity
 - Faculty overlapping exercises: “real world projects”
 - transdisciplinarity – to learn how to identify / define / implement sustainability energy demand
 - innovation strategy – to understand sustainability as a strategic element regarding innovation planning of organizations
 - diversity of teams
 - comprehensiveness of possible targets and target groups

Educate sustainability energy consumption – at companies etc.

- Sustainability as a strategic component of companies' innovation strategy
 - Appropriate professional, social, and cultural diversity of innovation teams for improving quality of outcome
 - Comprehensive perspectives for reducing risks of failure
- Inter- and Transdisciplinarity
 - Check of feasibility of novel ideas
 - In particular required in case of innovations with direct impacts on social life, e.g. smart meters, digitalization
- Learning to deal with the Collingridge dilemma

Educate sustainability energy consumption – for capacity building in (energy) communities

- Increasing need or wish to control energy supply by itself
- Knowledge needed regarding
 - precise aim of the (energy) community, e.g. to increase reliability of energy supply for economic activities
 - technological opportunities
 - economic and legal constraints

➔ Transdisciplinarity!

- Training needed in
 - self-organizing
 - self-confidence

Résumé

- Education in Sustainability Energy Consumption seems to be like “generating” Supermen or -women (for those knowing German: eierlegende Wollmilchsau)
 - Knowledge in content of different disciplines
 - Knowledge in sustainability science
- Rather impossible from an individual perspective
- Maybe overarching aim of education: creating empathy for other perspectives



<https://www.unicef.org/reports/transforming-education-equitable-financing>

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Innovation strategies in the context of sustainability

- Innovation strategies: long-term planning
 - setting the ways and means to develop and implement novel technologies, products, organization, etc. and implement them
 - setting the target group of the innovation
- Innovation and sustainability
 - broadening the scope of thinking by increasing (professional, social, and cultural) diversity of teams and including environmental and societal impacts => reducing risk of failure and improving contribution to societal (and organizational welfare)

Innovation strategies in the context of sustainability

- Traditional (technological) innovation hubs
 - Companies (in cooperation with Universities)
- “New” innovation hubs
 - NGOs
 - Communities / public organizations