Empowering the teacher – ESD the Chalmers way

Magdalena Svanström
ESD at Chalmers University of Technology – some landmarks

- Courses on environment and SD for all students. Policy 1985. Compulsory 2003-
- Gothenburg Centre for Environment and Sustainability (GMV) 1989-
- Chalmers Environmental Initiative – 7 professors 2000-2008
- Environmental Management System (EMS) 2004-
- Conferences and workshops on learning for SD 2001-
- Chalmers Students for Sustainability 2001-
- AGS 2001-
- The ESD project - 3-year reform project 2006-2009
- Vision: Chalmers for a Sustainable Future 2008-
- UNESCO chair in education for SD 2006-
- ESD integrated into EMS 2012- and process organisation 2014-
- ESD compulsory for PhD students 2012-
- First Vice President for SD 2010-
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The general structure of ESD in Chalmers’ educational programmes

- Mainstreaming – part of all educational programmes
- There is a core content that needs space in the curriculum
- It should be angled towards the specialisation
- Sustainability issues also need to be integrated into the curriculum – ideally, as the point of departure
Courses marked by programme directors to fulfill the local course requirement in 'environment and sustainable development' (E&SD)

Academic year 2011/12

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- = Full course
- = Part of course

Full height of row = 15 hec
Content of compulsory ESD courses at Chalmers – comparison to desired competences
(document developed by ESD teachers in 2005)

A. The concept
- History
- Definitions
- Ethical incentives
- Dimensions
- Communication

B. Problems; causes and measures
- State and trends
- Critical problems
- Systemic thinking - methods, models
- Measures, strategies
- Drivers and barriers

C. The professional role
- Change in SD context
- Individual responsibility
- Opportunities


Concept too briefly introduced; Ethical perspective is missing
Too narrow systems studied
Individual reflection often missing
‘Recommended’ learning outcomes in the local course requirement in E&SD (2009)

<table>
<thead>
<tr>
<th>Knowledge and understanding</th>
<th>Account for the concept of SD and the political ambitions behind it</th>
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<td>Account for causes behind unsustainable development, including relevant examples of states and trends in natural and societal systems</td>
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<td>Describe the profession’s interface to natural and societal systems</td>
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<th>Skills and abilities</th>
<th>Use a systemic perspective to analyse product life cycles and cause-effect chains that reach from technical systems to natural and societal systems, and be able to interpret models of these</th>
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<td>Use problem solving, critical and creative thinking, be able to communicate and cooperate, and be able to discern power issues in different decision-making processes in order to prepare for life-long learning and for becoming an effective change agent for SD</td>
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<td>Apply and shift between different perspectives in order to understand the situation of other stakeholders, and in order to be able to determine the viability of different options</td>
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<td>In a structured way reflect on his or her professional role and responsibilities as a professional and as a citizen in relation to SD</td>
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<th>Attitudes</th>
<th>Separate facts from values, identify ethical dilemmas, and be able to apply and discuss different ethical principles</th>
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<td>Accept that judgements are based on both facts and values, and that different value bases can give different outcomes</td>
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Are we educating engineers with the competences that industry requires?

Diploma thesis performed in 2009-2010; Interviews with 16 companies and 5 organizations, alumni survey, course content analysis (70 courses), student survey.

Some conclusions:

• **Industry** demands more competences in SD amongst all engineers than what is currently provided at universities in Sweden. A stronger focus on the business perspective is wanted.

• 35% of **alumni** claim to encounter sustainability issues regularly in their work. Only half of them believe they possess enough competences to make decisions from a sustainability perspective.

• **Quantity, coverage and the level of integration in the educational programme** seem to be important for the **students’** perceived competence on SD and for the importance that they put on achieving SD.

"Do you regard knowledge in sustainability relevant for your education?"
Embedding sustainability into the engineering curriculum

Overall approach:

Change will only come if people in the system have the will and the skills and if they are encouraged and even pushed by the system.

Teachers are key players!

Seek impact on two important facets of change – individuals as well as their environments.
Lessons Learned from Efforts to Integrate ESD into Educational Programmes at Chalmers

**People** and **structures** in the organisation need to be targeted; changes of attitudes, capacity building, drivers for change etc

- Try to find out **what motivates change**, e.g. academic merits, money, ...
- **Hitch-hike** with other processes of change, e.g. Bologna effort, audits (watch out for change fatigue!)
- Identify, respect and use existing **structures**, e.g. the annual course development cycle
- Try to get **everyone** to feel **responsible** – avoid lock-in to individuals and groups (but someone has to have the main responsibility!)
- Try to **initiate learning processes** in individuals – in many places and at many levels: “How does your area contribute to SD?”
- Showcase **champions** and **good examples** to show that change is possible and positive

We focus on the scholarship of teaching and learning (SoTL) in pedagogical development (including ESD)

- Becoming critically reflective practitioners, doing Action Research
- E.g. learning centre seminar series and annual conference on teaching and learning (KUL):

  - Jun, First call for abstracts
  - Feb, publ. workshop
  - Dec, decision
  - Dec, new abstract
  - Nov, revision workshop
  - Nov, feedback
  - Nov, reviewer dialogue
  - Nov, abstract
  - Oct, peer coaching
  - Jan, Conference
  - Publication
We make sure that research in engineering education (including ESD) is possible and legitimate

Examples:

• EER graduate school in May 2010
• A learning ”Milieu” at Department of Applied IT with new research groups
• Two PhD students funded by educational management
  – Tabassum Jahan: Teaching mathematical models
We review how well ESD is embedded in the university structure

E.g.:

• how well ESD is covered by the new process descriptions (process orientation of the whole university)
• how well ESD is promoted by the EMS
• how ESD should appear in Diploma of Higher Education
• how ESD experiences can become a career advantage (e.g. pedagogical portfolio)
• how ESD can be put on the agenda in planning and follow-up activities (department planning dialogue, staff appraisal discussions etcetera)
Process organization: Describes routines and responsibilities
EMS: Plan-Do-Check-Act in relation to targets (visions and demands)
PedUL = Pedagogical development leader
Empowering the teacher – ESD the Chalmers way

- Mainstreaming and embedding
- Motivate and support individuals
- Promote and safeguard ESD with the university structures

Whole systems approach!
INTERNATIONAL CONFERENCE
ENGINEERING EDUCATION IN SUSTAINABLE DEVELOPMENT
E E S D ’ 1 0
Göteborg, Sweden
19-22 September 2010

Foto: Maria Svane
Thank you for listening!
Compulsory PhD course on research ethics and SD

Essay writing:
Reflections on research project in relation to SD

Read 2 specified texts
Read 3 texts from list
Interview supervisor
Interview 'external' person
Student group peer review seminar

Lecture/ seminar on models of SD
Lectures/ seminars etc on issues in ethics
Review 4 other essays
Lecture/ seminar on ethics and SD
Generic feedback on essays

Preliminary essay
Final essay

Better ability to reflect around the own research in relation to SD