

# Paper 59. Pedagogical Support for Education for Sustainable Development

## - Description and evaluation of a New Support Function for Teachers and Programme Directors at Chalmers University of Technology

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### Abstract

The study programmes at Chalmers University of Technology have to fulfill the Swedish degree ordinance, which includes intended learning outcomes in environment and sustainable development (E&SD), and also the local course requirement on 7.5 higher education credits (hec) in (E&SD) and 7.5 hec in science, technology and society. A new pedagogical support function for education for sustainable development (ESD) was initiated at Chalmers in October 2012 to support mainly teachers and programme directors to fulfill the aims of Chalmers to improve the quality of ESD and to increase the quantity of ESD in the study programmes.

The aim of this paper is to share experience and to give inspiration for how a pedagogical support person for ESD can work at a university. The objectives are to: 1) describe the work performed by the support person so far by describing the involvement in projects and activities; 2) suggest a method for evaluating the projects and activities that the support person is involved in; and 3) evaluate the projects and activities that the support person has been involved in so far by applying the suggested method for evaluation.

We suggest that the projects and activities that the support person is involved in should be evaluated in relation to the aims of ESD at Chalmers: 1) *improved quality of ESD*, which can be defined as how well the education is aligned to the intended learning outcomes relevant for ESD in the Swedish degree ordinance; 2) *increased quantity*, which can be measured as the amount of higher education credits that are relevant for ESD in the study programmes. We believe that some prerequisites to be able to accomplish these aims are to 1) *build competence for ESD*, i.e. competence in SD and appropriate pedagogical approaches among programme directors and teachers; and 2) *integrate ESD into the regular organization and administration for education*. Thus, the projects and activities that the support person is involved in should be evaluated also in relation to the fulfillment of these prerequisites.

One of the main challenges is to build competence for ESD, and some of the conclusions are that 1) activities to build competence should be integrated in projects whenever it is possible, and that 2) the support person does not perform the work that the teachers or programme directors should be responsible for, but that the support person mainly work as a coach.

### 1 Introduction

There is a growing need of competences in sustainable development (SD) in society. Engineers has been pointed out as one important group of professionals who needs to have such competences, and it is not enough to educate just a few experts within environment and SD (E&SD) but there is a need for the large group of engineers in all fields of engineering to have some competences in E&SD (Hanning *et al.*, 2012).

The study programmes at Chalmers University of Technology have to fulfill the Swedish degree ordinance, which includes intended learning outcomes (ILOs) that are relevant for ESD. For the MSc in engineering degree, the student shall:

- 1) show ability to develop and design products, processes and systems with consideration of conditions and needs of people as well as society's goals for economically, socially and ecologically sustainable development;
- 2) show ability to formulate judgments that include reflection on relevant scientific, social and ethical issues; and to show insights on ethical aspects on research and technical development;
- 3) show insight into the possibilities and limitations of technology, its role in society, and people's responsibility for how it is used, including social, economic and environmental aspects as well as aspects related to the work environment.

There are similar ILOs in the Swedish degree ordinance for other BSc and MSc degrees that can be obtained at Chalmers.

In addition, there are local course requirements for ESD for the study programmes at Chalmers. These requirements are based on a long tradition working on ESD issues at Chalmers since at least the 1980s when a policy was introduced saying that environmental issues should be included in all study programmes. The ambition for ESD at Chalmers has grown over the years and is visible not at least in the vision saying: "Chalmers for a sustainable future". According to the local course requirements, all study programmes should include 7.5 hec (higher education credits), i.e. five full time weeks of study, in environment and sustainable development (E&SD) and the MSc in engineering programmes should include 7.5 hec in science, technology and society (STS). These local requirements do not require any additional ILOs compared to the Swedish degree ordinance, but they contribute with a quantification of the content in E&SD and STS.

There are some good examples in ESD at Chalmers but there are also some needs for improvements (Enelund *et al.*, 2013; Svanström & Lundqvist, 2013). The study programmes at Chalmers have different solutions for how to include E&SD and STS and the programme directors have made different interpretations of what is meant by E&SD and STS (Lundqvist & Svanström, 2008). In a study by Hanning *et al.* (2012), it is shown that the environmental content is usually sufficient in the E&SD courses but that the social and economic content have to be increased to fulfill the needs of industry. It is also shown that study programmes that include both a separate course in E&SD and integrated parts in E&SD in other courses can increase the motivation among the students and give rise to a more comprehensive understanding of E&SD. However, it is just a few of the study programmes at Chalmers that include both a separate course in E&SD and integrated parts in E&SD in other courses. In September this year, the Swedish National Agency for Higher Education will present their results of an evaluation of most of the engineering study programmes in Sweden. The study programmes are evaluated in relation to the ILOs in the Swedish degree ordinance and there is a risk that some programmes will get an insufficient result for the ILOs that are relevant for ESD, e.g. concerning ethical aspect.

The work on ESD issues at Chalmers since the 1980s has resulted in valuable experiences in change processes. Three important components for successful change projects that have been described by Holmberg *et al.* (2012) are:

- 1) to create a neutral arena for ESD: i.e. in order to avoid lock-in effects it is important that it is a neutral arena, such as a center, that is responsible for ESD at a university in which all faculty members can be invited to participate;

- 2) to encourage individual engagement and involvement: i.e. it should be a participatory process in which teachers and programme directors etc can take part and have influence;
- 3) to communicate commitment from the management: which can work as a strong incentive for change.

In line with these three components for change, a new pedagogical support function for ESD was initiated at Chalmers in October 2012 to support mainly teachers and programme directors to fulfill the aims of Chalmers to improve the quality of ESD and to increase the quantity of ESD in the educational programmes.

The aim of this paper is to share experience and to give inspiration for how a pedagogical support function for ESD can work at a university. The objectives are to:

- 1) describe the work performed by the support person so far by describing the involvement in projects and activities;
- 2) suggest a method for evaluating the projects and activities that the support person are involved in; and
- 3) evaluate the projects and activities that the support person has been involved in so far by applying the suggested method for evaluation.

## **2 Pedagogical support function at Chalmers University of Technology**

The pedagogical support person has an assignment and gets funding (30% of a full position) from the Vice President responsible for education at a Bachelor and Master's level. It is the Vice President who decides which main activities that the support person should prioritize on an annual basis. For 2013, it was decided that the ESD work should be prioritized on making improvements for identified weaknesses in connection to the evaluation performed by the Swedish Agency for Higher Education.

The assignment for the pedagogical support function is time limited to the end of year 2015. The aim is that ESD activities should, if possible, be integrated into and become a natural part of the regular organization and in that they make additional work of the support person unnecessary. It is important that the responsibility of ESD activities is divided among different actors in the organization at places where it should come in naturally, such as study programme directors and vice heads responsible for education at research departments. The ambition is that the ESD work at the university should be a joint effort that involves many actors.

The pedagogical support person is connected to two centers at Chalmers: the Centre for Environment and Sustainability (which is a joint center together with the University of Gothenburg) and Chalmers Learning Centre. Both centers are working across the whole university to give support on SD and pedagogy, respectively. Together they work as relevant platforms for the work of the support person, and some activities performed by the support person can be located at these centers or performed as joint activities together with the centers. The centers can work as good platforms to support competence building in SD and ESD in the organization. The activities so far have been to organize half day seminars on ESD to which programme directors and teachers have been invited with the purpose to present some good examples to increase knowledge and give inspiration. The Learning Centre organizes an internal pedagogical conference each year, which is an additional arena where the support person can give presentations on ESD.

A major part of the work performed by the pedagogical support person is to give support to different actors who are involved in the education at Chalmers. The educational organization at Chalmers is separated from the research departments, and there are annual agreements between the educational organization and the research departments about the delivery of courses to the study programmes. The programme directors are responsible for the quality of the study programmes and the research departments have the responsibility to deliver courses with good quality. The study programmes are divided into four educational areas, and the heads of these areas are part of the management team for education, which is led by the Vice President for education. The role of the support person is to emphasize the responsibilities of the actors involved in the education and to give support to these actors to accomplish good quality in ESD. This support can be given towards individuals, i.e. mainly programme directors and teachers.

Some examples of support that have been given to the *educational organization at a central level* are to:

- give support to the Vice President for education for the formulation and follow-up of annual goals, indicators and activities for education in the environmental management system;
- suggest requirements on Chalmers' courses in E&SD and STS in order to improve the alignment with the Swedish degree ordinance, and to follow-up the quality of the present courses in E&SD and STS;
- work as a programme director for STS courses that do not belong to any specific study programme, which includes to follow-up the quality of these courses and to order them from research departments;
- work as a contact person on ESD for external actors, e.g. the University of Gothenburg;
- up-date information about ESD at internal web pages and in student recruitment material etc;
- give suggestions for how ESD activities can be connected to the environmental management system and to the process "to educate".

Some examples of support that have been given to the *educational areas and programme directors* are to:

- support programme development involving courses in E&SD and STS, e.g:
  - o summarize the results of a survey to all the students in one of the educational areas about courses in STS and to give recommendations for future work;
  - o to find teachers at the University of Gothenburg who could give or develop new STS courses;
  - o plan and lead a project with the purpose to integrate ethics into the 13 Master's programmes of one of the educational areas;
  - o identify and spread information to Master's programme directors about courses in E&SD at an advanced level at Chalmers that can be recommended courses in their programmes.
- support programme directors when ordering courses from research departments to make sure that the courses fulfill appropriate competences in E&SD and STS.

Some examples of support that have been given to *research departments and teachers* are to:

- give support for course development;
- give suggestions for how to fulfill annual operational goals for integrating SD in courses.

The pedagogical support person is also part of a newly established “coaching group” that is led by the Vice President for sustainable development and which includes “coaches”, i.e. support persons, for the core activities of the university, i.e. education, research and utilization, and also for support activities such as communication and internal environment. The group meets every second week and the purpose is to share information and experiences about ongoing activities with the aim to learn from each other and to find possibilities for cooperation.

Most of the activities that have been performed by the support person so far are rather small activities that have taken from just a few hours to a few days to perform. There is only one larger project that is going on and that is a project with the purpose to integrate ethics into the Master’s programmes of one of the educational areas. The meetings with the coaching group also take some time.

### **3 Method for evaluation**

We suggest that the projects and activities that the pedagogical support person is involved in, together with other actors at the university, should be evaluated in relation to the *aims* for ESD at Chalmers (in 2012):

- 1) *improved quality of ESD*, which can be defined as how well the education is aligned to the intended learning outcomes relevant for ESD in the Swedish degree ordinance;
- 2) *increased quantity*, which can be measured as the amount of higher education credits that are relevant for ESD in the study programmes.

We believe that some *prerequisites* to be able to accomplish these aims are to:

- 1) *build competence for ESD*, i.e. competence in SD and appropriate pedagogical approaches among programme directors and teachers; and
- 2) *integrate ESD into the regular organization and administration for education*.

Thus, the projects and activities that the pedagogical support person is involved in should be evaluated also in relation to the fulfillment of these prerequisites.

In the following, we refer to the two aims and the two prerequisites above as the four *evaluation criteria*.

## **4 Results**

### *4.1 Improved quality of ESD*

Several activities that the the pedagogical support person is involved in have the aim to improve the quality of ESD. One activity that is going on, and that has this as an explicit aim, is to suggest requirements on Chalmers’ courses in E&SD and STS in order to improve the alignment with the Swedish degree ordinance. Such requirements could have a large impact if they were decided upon by the Vice President for education, and followed-up with an evaluation of the present courses based on these requirements, and later also with support. Another strong incentive for change may be the results from the evaluation performed by the Swedish Agency for Higher Education, depending on the outcome of the evaluation in August.

The support given for programme and course development has the aim to improve the quality. However, since it is the programme directors and teachers who are actually going to perform the development, these actors have to be motivated and have the appropriate competences. The support person can work with the aim to increase the motivation and to build competence, e.g. by sharing knowledge and experiences. A

visible effect that could be measured from this support can be additional or reformulated intended learning outcomes that are relevant for ESD in the course descriptions, which are revised annually. The pedagogical support function has not been in function long enough to yet be able to see concrete examples of such intended learning outcomes.

#### 4.2 *Increased quantity of ESD*

The support given for programme and course development also has the aim to increase the quantity of ESD. However, again it is the programme directors and teachers at research departments who have the power. The outcome from the evaluation performed by the Swedish Agency for Higher Education may be a strong incentive also when it comes to the quantity of ESD – at least for some parts of the education such as at the Master’s programmes where we in some cases have seen a lack of content on ethics.

A visible effect that could be measured from this support can be additional course descriptions that include intended learning outcomes that are relevant for ESD in the descriptions of the study programmes, which are revised annually. The pedagogical support function has not been in function long enough to yet be able to see concrete examples of such intended learning outcomes.

#### 4.3 *Build competence for ESD*

Several of the activities that the pedagogical support person is involved in have the ambition to build competence for ESD. The seminars organized together with Gothenburg Centre for Environment and Sustainability and Chalmers Learning Centre have the explicit purpose to contribute to increased knowledge and inspiration for ESD. These seminars are open and programme directors, teachers and other interested are invited. The larger project on integrating ethics into Master’s programmes in one of the educational areas is also including a seminar on ethics for programme directors and teachers and has the explicit purpose to build competence. The open seminars that are organized by the centers are voluntary to attend and can therefore not guarantee competence building for a large part of the actors. However, seminars that are organized by educational areas, study programmes or research departments may encourage more teachers etc to attend since they may feel a stronger connection to these organizational bodies.

The individual support given to different actors involved in education also has the ambition to work as learning situations that can build competence. In the individual support, the pedagogical support person can work as a coach but also as an expert who can share knowledge and experiences, e.g. with programme directors and teachers concerning programme and course development. It is difficult to say how successful this ambition has been on a short term but should rather be seen as a long term process.

#### 4.4 *Integrate ESD into the regular organization and administration for education*

The activity to suggest how ESD activities can be connected to the environmental management system and to the process “to educate” has the direct ambition to integrate ESD into the regular organization and administration. This work has not been finished but will continue to find more possible and relevant connections (Svanström *et al.*, 2013). There are good possibilities for a successful outcome of this work since it is performed together with the leader of the process “to educate” and the environmental manager who is responsible for the environmental management system.

The support given to actors who have a defined responsibility in the organizations is performed with the ambition to not take the responsibility away from those actors but to rather encourage the actors to include ESD more explicitly as a part of their responsibilities. This has been the case when given support to: the Vice President responsible for education, the process leader for the process “to educate”, the heads of educational areas, study programme directors, vice deans responsible for education at research departments and teachers. It is difficult to say how successful this ambition has been on a short term but should rather be seen as a long term process.

The activity to work as a programme director for STS courses that do not belong to any specific study programme is not in line with the criteria to integrate ESD into the regular organization! However, this

activity is seen as a short term solution of a situation that was caused by historical reasons and the ambition is to phase out the system to have STS courses that do not belong to any specific study programme. It should be the study programme directors who should have the responsibility for following-up the quality of these courses and for ordering them from the research departments. The pedagogical support person support the educational areas and programme directors to phase out the system, e.g. by identifying teachers at the University of Gothenburg who could potentially give or develop new STS courses; and to support programme directors when ordering courses to make sure that the courses fulfill appropriate competences in STS.

There are some activities that are performed by the pedagogical support person that have not yet found a natural place in the organization, e.g. to up-date information about ESD at internal web pages and in student recruitment material.

## **5 Discussion and conclusions**

So far there has been a diversity of activities and projects that the pedagogical support person has been involved in, and the support person has been in contact with different actors. The function has been successful in the sense that there has been no lack of work and the interest from the organization to get support has been constantly increasing since the start.

The method that is suggested for evaluating the projects and activities that the support person are involved in can work as a good start and we have shown that it can be used for a qualitative discussion around the work performed in projects and activities. However, the suggested evaluation method has to be presented to and discussed with other actors at Chalmers, and then mainly the Vice President for education who has assigned the function. This paper can then work as a starting point for such a discussion.

It is not that clear how the aims for ESD, i.e. improved quality and increased quantity, could be measured to be followed up on an annual basis. Some challenges are how to operationalize good quality based on the ILOs in the Swedish degree ordinance and which criteria to use for ILOs to be relevant for ESD. Work that has been performed in this direction has been made by Lundqvist *et al.* (2013) but may need some further development.

In this paper, it has not been possible to make a complete evaluation of the activities and projects that the support person has been involved in so far since the work has just been started and there are not yet so many visible results. However, the recommendation is to perform a regular evaluation for the work that is performed.

Programme directors and teachers are key persons to reach the aims for ESD. Thus it is important to consider the prerequisites to *build competence for ESD* and *integrate ESD into the regular organization and administration for education*. One of the main challenges is to build competence for ESD, and some conclusions are that 1) activities to build competence should be integrated in the work whenever it is possible, and that 2) the support person does not perform the work that the teachers or programme directors should be responsible for, but that the support person mainly work as a coach, and that should be clearly communicated to the organization.

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