

## **Education for Sustainable Development**

### **Team Teaching and Teacher Training**

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#### **Abstract**

A course concept of team-teaching has been developed to enable teams to plan ESD, practise ESD, evaluate ESD, and to instruct new teams. Step one: In-service-teacher-training. Team teaching is necessary to ensure that environmental, socio-cultural, and economical aspects are all included in ESD. Inspiration is needed. Step two: Teams practise achieved methods thematically at school level. Team-teaching is interdisciplinary and cross curricula. Clear overall goals and competencies are formulated. Local environmental conflicts are suitable starting points. Students practise scientific research methods. Students use historical methods to understand what caused to-days conflict. Reflective thinking is achieved through discussions on literature and text analyses. Students suggest solutions. By presenting their work to others students are empowered to discuss if observed changes have been for the better or for the worse. Synopsis assessment is carried out. Step three: Team-teachers teach new team-teachers. Educational sharing includes it communication and materials.

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## **Background**

Denmark has national and international obligations on Education for Sustainable Development, based on the Århus Convention (1998), the Baltic 21 Education Haga Declaration (January 2002) and the United Nations' World Summit for Sustainable Development in Johannesburg (September 2002). The principle for Sustainable Development, mutually agreed upon in Johannesburg, is based on the three pillars: Economic development, social development and environmental protection. How then, can all three pillars, the environmental, the social, and the economical be implemented, taught and reflected in the Danish formal educational system?

The first step is inspiration. Based on practical work made by students and teachers in their school work and in their international school networking, two books have been published in the UNESCO Baltic Sea Project, a network of schools in the Baltic Sea Region. "*Education for Sustainable Development – Baltic 21*" was first presented at the Nordic Ministers' Meeting in Karlskrona, Sweden in May, 2003 and at the UNESCO conference "Education for Population, Environment and Sustainable Development" in Beijing, China in November 2003. *Learning from Environmental History in the Baltic* was published and presented at the ESD conference "Learning to Change Our World" in Gothenburg, Sweden in May 2004. The materials mentioned have both been published for inspiration to be used in educational work. They suggest working methods and themes that have been discussed, decided, and tried out in the classroom. To enable students to understand the complex concept of sustainable development the next important step has been to educate their teachers to achieve or develop further a holistic approach. In the formal Danish educational system teachers who teach the upper secondary level of 16 – 19 year old students, pre-university level, typically have a university degree, allowing them to teach their two subjects. Normally this is practised with a single teacher teaching his subject to a single class of app. 28 students.

## **In-service-teacher-training**

To enable teachers to team-teach the challenge has been to organise that class-based teams of teachers could venture to participate in the same in-service training courses. With financial support from the Danish Ministry of Education it was made possible to bring together teams from a number of schools for three days so that they could learn together how to possibly teach as a team, and also to undertaking the task of becoming future ESD instructors for other teams. Each interdisciplinary team was defined to consist of three teachers representing the three different faculties: The natural sciences, the social sciences, and the humanities. The capacity building of the teams of teachers is an ongoing process proceeding during the current school year 2004 – 2005. The whole concept of the in-service teacher training can be divided into four phases that will be further dealt with in the following paragraphs: Planning – Practising – Assessing – Instructing new teams.

## **Planning cross curricula work on ESD themes**

Inspiration is crucial before planning. When you get new ideas and can share them with others, it is most likely that your "practise as usual" will change and hopefully improve. In August 2004 a number of teams met for three days of joint inspiration, learning and discussing and planning, refreshed after six weeks of summer holidays, and most importantly: Away from the hustle bustle life and responsibilities at school and at home. All participants received a personal copy of each of the UNESCO books *Education for*

*Sustainable Development - Baltic 21 and Learning from Environmental History in the Baltic Countries.* The participants were inspired and updated on the three different approaches to ESD through lectures and workshops by skilled university professors and by local NGOs that could introduce a local conflict in dialogue with the participants. Science teachers learnt of “optimum pollution” from a professor of economy, language teachers of the “precaution principle” from a scientist and all learnt about reflective thinking on ESD from a skilled professor of philosophy.

Environmental history was introduced and suggested as a useful working method, suitable for cross curricula research work with students.

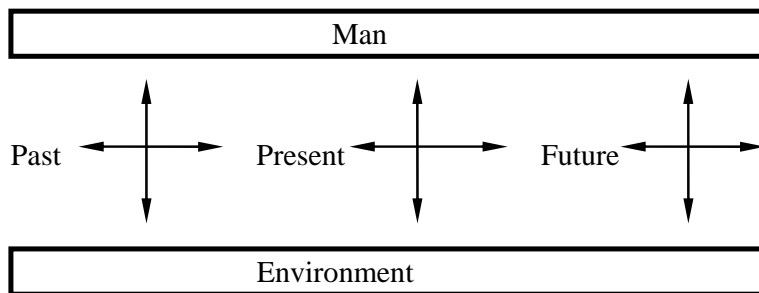


Figure 1  
*Learning from the past for the decisions of the future*  
*A time line is a useful tool in environmental history work*

Team teachers tried out the method on location, observing locally what could be general topics of conflict: What kind of surroundings were there? What formed the landscape? What energy supply was there? What kind of transport prevailed? What caused the local municipality to make urban planning to change the use of the local harbour? How were industries and super markets placed in relation to civil homes?

During this part of the course it became evident and very obvious to all participants that teachers have a tendency to regard the world through the values of and traditions in their own subject: Academic and highly knowledgeable Danish teachers with a university degree look at their surroundings very differently if they teach biology or physics, civics or history, philosophy, geography, music or Danish literature!

One question to be considered at this point is to confront each teacher with the question, “*Do you teach your subject or do you teach your students?*”

For the participating teachers the difference in observations was an eye-opening experience! All reckoned that all the differences noticed during a rather brief “walk and talk” session signalled that there would be major challenges to overcome in the planning of joint teaching.

One positive remark was that the differences would also lead to valuable sources of inspiration. That in fact teachers can learn from each other and inspire each other tremendously when working on the same theme using the different perspectives of their subjects!

Culture and traditions in the Danish educational system have prevented much team-teaching, but most of the participants attending the course, however, were not beginners. They came with a variety of experiences, most frequently from two or three related subjects working together e.g. biology, physics and chemistry, geography and social sciences, or Danish and history. But to work on ESD issues from *all three* different angles was new to every single teacher.

During the course each team of teachers had precious time to discuss and decide upon their joint theme to be carried out and practised after their return home. They also discussed the target group, the students: Clear objectives on the general concept of sustainable development and of the subjects had to be formulated as well as the competencies that the students were to achieve. Likewise needed the assessment in the form of a synopsis be designed. This in itself is a new concept that will be introduced in the formal system from August 2005. Suggestions were made to make a small collection of suitable articles that could be handed out to the students beforehand, and then specially designed questions could be connected to the articles and handed out when students sat for the assessment.

Time is a crucial factor for team-teaching. And time is needed for good planning together. Spending three days together was a premium opportunity! In the ordinary working situation at school time for planning would be one of several obstacles. Teachers are – as we well know - very busy people, indeed!

### **Practising interdisciplinary and cross curricula teaching on ESD themes**

Returning home meant that hard work was ahead for each team. Were the plans well made, could they fit the school time table? Would the students accept all the suggestions and proposals that their teachers came up with? Could other colleagues be interested in being associated with the team's work in order to achieve even more synergy in the learning process?

As the practical part is still an ongoing process at the time of writing (November 2004) no general conclusions can be made. A concrete example, however, can be given from my team. The team consists of three colleagues teaching physics, Danish and English. We made plans for a thematic work on sustainable industry.

*Obstacle one: the three faculties.* Our team does not represent the three faculties! How could we make up for the lack of historical and economical expertise? Could we invite a social science or a history teacher? Should we invite a skilled lecturer from an outside university to give an input? Fortunately our history colleague is skilled in environmental history and his voluntary and active participation became of major importance for the team's work.

*Obstacle two: curriculum.* By taking a starting point in a *local* environmental conflict of today a study of the historical relationship between man and nature can be carried out, we knew from the introduction and from previous experiences e.g. on joint team work between biology and history on sustainable agriculture.

But, for an English teacher tied to a curriculum defined by national standards focusing on English literature from native speaking nations it was difficult to take the starting point in a local problem. Local means Soenderborg, a small provincial town of 30.000 inhabitants in the southern part of Denmark. We have tried this before, however, with biology as my major

subject. Then a local conflict is very easily investigated. But as an English teacher in this team work, I had a problem!

We decided, therefore, to make the starting point in a universal and great environmental conflict, the global climate change. This could be related to local parameters in subjects such as history and geography. We used Will Steffen's excellent executive summary showing how almost all graphs increase from the 1950s onwards. The number of Mac Donald Restaurants in the world, the number of dammed rivers, the number of telephones etc. – concrete examples that appeal to our students. Our students are all consumers. They know, too, that they are among the richest youths in the world, but they have difficulty in grasping that it has at some time been different, and that it may again be different. They have difficulty understanding how being a consumer might have a direct or indirect impact on say the climate. Using the industrial revolution retrospectively enabled our colleague teaching geography to join in as another associate team member. He and the physics teacher taught theories on the global climate change and introduced models for reversing ocean currents threatening water, air and land on a global scale.

In English and history we turned to where it all began, we turned to England and the Industrial Revolution, read texts that focused on the fascination of the great inventions, the steam engine, the utilising of coal and coke for steel and machinery etc.

We studied changes from rural England to metropolitans with smoke pollution causing industrial melanism yet proving Darwin's theory of natural selection. Students understood that the change from rural to urban life changed landscapes, society, life for the individual dramatically, and by reading Dickens, Blake, Wordsworth etc. they have achieved knowledge on utilitarianism and the basis for a class divided society that had a great impact on the development in the entire world. The students have shown great interest in themes such as science and inventions, health issues, transport of raw materials and exported goods, railway constructions and in social conditions, gender issues, children at work. Pursuing how ideas spread to Denmark in both history and Danish have enabled the students to draw parallel lines between England and to the development of democracy in Denmark.

*Obstacle three:* How do we know that what the students have learned could not have been learnt without our demanding cooperation and team-teaching? A joint synopsis test shows that generally they do seem to understand the interrelationship between the subjects by now. Have we then succeeded in making an ESD model and success story out of our team-teaching?

*Success story one:*



*"The Chimney Sweepers": Students reach an understanding of the environmental, the economical and social problems that cause global warming of to-day when reflecting on their lives as consumers and dealing with how it all began - studying the industrial revolution two hundred years ago! "One suggestion could be to make transport on solar energy", they say...*

The students instinctively used the Industrial Revolution theme for the annual school birthday party in September. Tradition requires students to decorate their classroom and dress up according to a theme, and this year the theme was a historical era. We consider their choice a rather positive signal that they have been positively engaged in the work!

*Success story two:*

In physics the students have worked with both yesterday and to-morrow. Experiments on steelmaking and bulbs represent yesterday, but for tomorrow they have worked with solar cells in theory and practise: They constructed toy size solar cell cars and met a solar race challenge at the South Denmark University. They had inspiration from the educational website [pluggingintothsun.org.uk](http://pluggingintothsun.org.uk) and out of 35 solar race participating groups our students won the top five positions!

*Failure story one:*

After the synopsis assessment, however, it has become quite clear that some students do not understand the different methods used in the three faculties. They are not capable of transferring knowledge from one subject to another. They are therefore not capable of

dealing with sustainability viewing the aspect from all three perspectives. It seems as if the natural sciences appeal most to these students –experiments and facts rather than fiction and reflection. A gender issue? We have no indication of that, no.

### **What do the other teams do?**

“Traffic in Copenhagen” is the ESD theme for one team. The local conflict: The number of private cars in Copenhagen is rapidly increasing. Consumption of fossil fuels for energy increases, emissions of CO<sub>2</sub> etc. increase. Is transport then sustainable? The teachers involved teach physics, Danish and history. The students work with local Agenda 21 problems and try to measure their ecological foot print. They investigate in people’s choice of a certain type of transport. They monitor growth in a twenty-year old manmade forest west of the capital to see if planting of forests could be a method to reduce the problem. Growing trees absorb the emissions of CO<sub>2</sub> and act as a carbon sink. The students have written assignments, and they are preparing oral presentations as in December they will have visiting students from another project, and also an opportunity to discuss with a politician.

Other teams focus on themes e.g. “Carlsberg”, “Consumption and Consumerism”, “The Handling of Waste”, “Biotechnology and food production” – opportunities for ESD work are many.

### **Assessment**

The overall evaluation on the results and outcome of the synopsis assessments from all teams is on the agenda for January 2005. The teams will meet for a two day seminar to summarise and evaluate the process, the outcome, the obstacles, the successes and failures. Planning the cascade of instructing other teams is a main part of the teacher training course programme. This will be made in close cooperation with people from the educational centres that organise and advertise the courses regionally.

Before this joint event some of the students from Soenderborg will have the opportunity to travel to Copenhagen to meet with the team there working with traffic in Copenhagen. Students that present their work to each other gain action competence. They use their skills and have to be prepared for also meeting a decision maker, the Copenhagen mayor for the environmental strategies. They are to discuss strategies with her. In a recent Danish paper, the Politiken 10 November, it says that the manmade forest west of Copenhagen absorbing exhaust CO<sub>2</sub> is threatened by plans of constructing a new super highway for the increasing number of cars. But does this solve a problem or create one? Is transport sustainable? Can it ever be? Perhaps our students will introduce solar cells into the discussion and suggest a solution for future means of transport. Or maybe they’ll ask how public transport can be made attractive. The important thing is that they are put in a situation where they can make use their achieved knowledge.

### **Cascade**

Instructing new teams has been scheduled from March 2005 onwards: A number of regional in-service-teacher training courses have been scheduled at which some of the experienced teams will introduce their themes and results and state their own personal experiences to a totally new group of teachers. To even out local or regional differences at least two different projects will be presented in depth in order to instruct and inspire others. Materials such as books, it-links, useful references etc. will be distributed and shared. The instructors will focus on both successes and lessons learnt. Sometimes failures are perhaps even more educational than successes.

If experiences can successfully be passed on this way from one team to another is not for me to say. Yet. It remains still to be tried out and then others may judge.

### **Humble Answers**

By working together as teams in the classroom and by sharing experiences with and providing inspiration for other teams, it is our hope that teachers can make the students understand the different approaches needed to grasp ESD, so that they can use their knowledge from the local example also on the global scale. By focusing on the local environmental conflicts from the three faculties at the same time the students should gain action competence that enables them to suggest needed changes or come up with innovative ideas for solving the problems.

Another question is to measure how the focus on ESD can actually lead to the Brundtland definition of sustainable development - "*development that meets the needs of the present without compromising the ability of future generations to meet their needs*". Have we succeeded if focus on ESD enable students and teachers alike to analyse changes and together state if the changes are an improvement or the opposite? But then again – improvement for whom or for what: Man, economy, environment? The more complexity increases the more humble the answers seem to be.

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