Aalborg Centre for Problem Based Learning in Engineering Science and Sustainability under the auspices of UNESCO

Work plan 2014-2015

Introduction

This work plan follow the strategy plan for the Aalborg Centre for Problem Based Learning in Engineering Science and Sustainability under the auspices of UNESCO, hereafter the Aalborg Centre.

The Aalborg Centre is established as a Category 2 Centre that has been finally approved by the General Conference of UNESCO in November, 2013. In order to carry out the work, task forces have been established (see activities, below). This document is work in progress, and the activities in the work plan will be carried out due to available resources. Furthermore the work plan will develop during 2014-2015.

Mission

The overall goal of the Centre is to facilitate that universities play an active role in providing sustainable technological innovations by educating engineers and scientists that are able to participate in and contribute to the development of sustainable solution to the existing societal challenges. The activities in the Aalborg Centre will combine research, education and development in three areas: 1) problem based and project based learning in engineering and science education, 2) engineering education research within engineering sciences and 3) education for sustainable development linking to the broader field of sustainability (see figure 2 below).

Furthermore, the aim of the Centre is to connect university activities to activities in private and public organisations for sustainable technological innovation. The work of the Centre will also reflect the work plan priorities of UNESCO, for example with a focus on Africa and gender issues, in addition to sustainability.

The mission of the centre will be the following:
1) to create a global society of practitioners, researchers, experts and institutions within the field of Problem Based and Project Based Learning (PBL) in Engineering and Science Education and Sustainability from developing and developed economies;

2) to establish international research and doctoral training on PBL and sustainability in Engineering and Science Education;

3) to provide global formal education and training for academic staff and students and to disseminate and exchange knowledge and support among society members in terms of how to change engineering and science education for sustainable development at the national, regional and international levels;

4) outreach to institutions and schools for attracting students to engineering and science and give HE institutions and governments open access to a body of knowledge, education, training and other resources in order to facilitate PBL and Sustainability in Engineering and Science Education.

**Activities**

For the coming two years there will be four overall activities in the Centre: 1) Global Network, 2) Research and PhD programmes, 3) Education, and 4) Outreach.

The four main activities (global network research, education, and outreach) will be carried out within each of the subject areas (PBL, EER and ESD) as well as across and with integration of the subject areas.

![Figure 1: Scope of the Aalborg Centre](image)

**1) Global Network**

Global Network support will establish a global network of institutions already having or wanting to develop expertise in PBL and sustainability in Engineering and Science Education by running:
• conferences, research symposia, and seminars nationally, regionally and globally
• workshops and summer schools at both Aalborg University and around the world
• virtual communities to develop PBL for engineering, science and sustainability
• provide exchange of students and staff between related institutions
• develop relations between private enterprises and public organisations in order to connect educational programs with work based learning
• online tutorials, video and virtual seminars on PBL and sustainability

Priorities for the coming years:

**TF 1A: 2014-15: Task force Global Network**

- Establish a core PBL network across subject areas for PBL
  - Next research symposium, San Sebastian, 2015
  - Visitors’ workshops
  - Other seminar activities (e.g. Ireland May 2014)
  - Webinars
  - Open sources like online tutorials and videos

TF coordinator: Erik de Graaff and Aída Guerra

2) Research and PhD programme

Research and PhD programme support will focus on the establish:

• International research project
• collaborative and joint PhD programmes with partner universities,
• an online Doctoral School for PBL in Engineering Science and Sustainability including online PhD courses
• influence research training on sustainability by using PBL.
• develop the next generation of PBL models by integrating sustainability, intercultural collaboration, and ICT.
• initiatives to publish special journal issues, books on PBL and sustainability in Engineering and Science and initiate an online journal.

Priorities for the coming years:
3) Education and training

Educational support will be offered in the following areas:

- To offer interdisciplinary educations within sustainability for master students
- To run online master programs within PBL and sustainability combined with development of new formal degree based or certificate based programmes in the area such as Master Programme in Problem Based Learning in Engineering and Science (MPBL).
- To provide new methods for continuing education of professional engineers.
- To provide training for outreach activities for Engineering and Science Education, e.g. educational activities for staff in high schools.
- To assist different institutions in developing PBL models that are adequate to institutional and cultural needs.
- To develop adequate strategies for integration of sustainability in existing engineering and science programmes.
- To provide possibility for training and consultancy for institutions and individual staff members wanting to implement innovative pedagogy such as PBL.
Priorities for the coming years:

**TF 3A 2014-15: Task force AAU engineering and science education for sustainability**

- AAU profile for existing master programs within sustainability.
- Initiating implementation and development of sustainability in existing programs and by using teaching in area of PBL and STS in the first year program as a platform. This will involve head of study boards and school leaders.
- Consideration of new distance master on sustainability and ESD/PBL aimed at HTX teachers, university staff as part of the MPBL that is already accredited.
- Development of faculty development and continuing education courses on sustainability.
- Funding activities for scholarships.
- Participation in the general sustainable campus activities at AAU.
- Participation in external EU project.

TF coordinator: Jette Holgaard

**TF 3B 2014-15: Task force PBL and Staff development AAU internally and externally**

- Collaboration with learning lab on internal PBL workshops.
- Collaboration with PBL academy for external workshops.
- Summer school on PBL and ESD.
- Coordination and further development of MPBL.
- Project BSU (Building Stronger Universities) – workshops and training of trainers, with a focus on Africa.

TF coordinator: Bettina Dahl Søndergaard and Mona Dahms

**4) Outreach and regional development**

Open access to resources will be one of the leading principles for the centre. There will be developed diverse strategies for outreach activities regional as well as internationally. There will be initiated activities in the following areas:

- initiating PBL and sustainability in primary and secondary school and high school regionally
- outreach activities for improving science and engineering in primary and secondary school and high school regionally
- establishment of closer collaboration with institutions and companies in the Aalborg University region exemplary to overall regional development
- international capacity building in PBL and sustainability adjusted to cultural, institutional and economic conditions. Workshops will be held with a regional focus, focussing on
development within a particular region, such as Latin America, Asia, Africa and Eastern Europe, and touching on the spectrum of topics mentioned above.

**Priorities for the coming years:**

<table>
<thead>
<tr>
<th>TF 4A 2014-15: Task force on regional outreach activities to public schools and institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Establish relations to UCN, RCE-ESD, Universitarium and NTS centre for regional attractiveness activities.</td>
</tr>
<tr>
<td>• Work based learning activities for companies.</td>
</tr>
<tr>
<td>• Research application and EU network on attractiveness.</td>
</tr>
</tbody>
</table>

TF coordinator: Lars Bo Henriksen

### 5) Administration and Funding

The Aalborg Centre will be funded partly by Aalborg University and partly by relevant external funding sources. The permanent yearly budget will be covered by Aalborg University. In addition hereto, several of the centre’s activities will be based on participants’ fees or external funds through project cooperation. Obtaining external funds will be considered a priority in order to ensure a strong platform for cooperation and development of key projects within PBL and sustainability in engineering and science education. The external funds will be applied for through both national and international funding programmes; e.g. the programmes of the Danish Ministry of Science, Innovation and Higher Education, the Danish DANIDA programme, relevant EU-programmes, the World Bank programmes and from private organisations and companies.

<table>
<thead>
<tr>
<th>For 2014: Task force on administration and funding activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Daily administration</td>
</tr>
<tr>
<td>• Funding strategy</td>
</tr>
</tbody>
</table>

TF coordinator: Anette Kolmos and Marianne Nyborg