

Centre for PBL & Sustainability: Enhancing Sustainability in Engineering and Science education

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Centre for PBL & Sustainability

Enhancing Sustainability in Engineering and Science education

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WHY THIS INITIATIVE?

As noted by Barnett (2000), the University finds itself in an age of super-complexity, with one of the most complex challenges of our time being to alter trajectory to a more sustainable society on a corporate, regional, national and international level. The political pressure is ever more distinct to provide sustainable scientific and technological transformations to decouple the increase in problematic environmental and social impacts from economic growth, and secure a balance between the three pillars of sustainability. As pointed out by Peet, Bijma & Mulder (2004), education is of crucial importance in this decoupling as sustainable development requires a long-term vision and integral approach.

Several researchers within the field of Education for Sustainable Development (ESD) have argued that a paradigm shift is needed in Higher Education to face these new challenges of sustainability, see for example Cortese (2003), Sterling (2004) and Gough & Scott (2007). On the institutional level this paradigm shift implies a more systemic perspective emphasising collaboration between different disciplines, and on the more operational level the process of education also has to change as stressed by Cortese (2003:19) in the following:

"The process of education will emphasise active experiential, inquiry-based learning and real-world problem solving on the campus and in the larger society"

Along the same vein, Sterling (2004) argues that an ecological paradigm for education is characterised by development and action-orientation; critical and creative inquiry; reflective and iterative learning; an indicative and open curriculum; learning in groups, organisations and communities; and a democratic and participative environment. We believe that the PBL philosophy embrace exactly those values.



A PBL approach means a focus on how students' learning process can be situated to the changing and challenging nature of real life problems. PBL is interdisciplinary, contextualised and student-centred, and the pedagogical means are changed from transferring knowledge to facilitating learning (Kolmos, 2006). According to Kolmos & Graff (2007) the cognitive learning approach of PBL is that learning is organised around problems and solved in a project-organised educational model with a dialectic interaction between the subjects taught in lectures and the real life problems dealt with in project work. The social learning approach is team-based and participant-directed and through the project work the students interact with surrounding stakeholders and thereby contribute to development of society in general (Kolmos & Graff, 2007).

Problem and Project Based Learning (PBL) has been shown to be an effective framework for educating engineers and scientists capable of solving complex tasks in a collaborative framework. In a Centre for PBL and sustainability (PBL-SUS) we wish to research and develop PBL methods for integrating Sustainability into Engineering and Science Education to foster sustainable scientific and technological innovations and transformations.



OBJECTIVES

At Aalborg University, 35 years experience in educating Science and Engineering students in a PBL environment has been accumulated, and The UNESCO chair in PBL in Engineering and Science education has the vision of furthering this by researching the possibilities for using PBL as a framework for enhancing ESD within this field.

In 2009 the vision of establishing a Centre for PBL and Sustainability under the UNESCO chair of PBL became reality with funding assistance from the Danish Obel fond.

The objectives for 2009-2011 are:

1. To create a global society of practitioners, researchers, experts and institutions within the field of Problem Based and Project Based Learning (PBL) and Sustainability in Engineering, Science and Health Education;
2. To establish international research and doctoral training on PBL and sustainability in Engineering, Science and Health Education;
3. To provide global formal education and training for academic staff and to disseminate and exchange knowledge and support among society members in terms of how to implement PBL in education, in carrying out research in PBL and in applying PBL for regional sustainable development;
4. To 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, Science and Health Education.

The UNESCO chair wishes to invite all interested parties to join the global network established in this centre among others researchers, business representatives, staff developers, and interested academic staff with emphasis on research and development in PBL, Engineering and Science Education and Education for Sustainable Development.

LEVELS OF ENGAGEMENT IN ESD

(Adapted from Sterling, 2004)

Education about sustainability

an "add-on" strategy

Education for sustainability

a "built in" strategy

Education as sustainability

a "re-build"-strategy

Toward a Sustainable Education Paradigm?



JOIN US!

Be a part of the global network on PBL & Sustainability

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REFERENCES

- Barnett, Ronald (2000): Realizing the University in an Age of Supercomplexity. Society for Research Into Higher Education & Open University Press.
- Cortese, Anthony D. (2003): The Critical Role of Higher Education in Creating a Sustainable Future, Planning for Higher education, March-May, Society for College and University Planning.
- Gough, Stephen and Scott, William (2007): Higher education and Sustainable Development, Paradox and possibility, Routledge, Oxon.
- Kolmos, Anette (2006): Future Engineering skills, knowledge and identity. In: J. Christensen, L.B. Henriksen and Anette Kolmos eds. Engineering science, skills and Bildung, Aalborg University Press, pp. 165-185.
- Kolmos, Anette & de Graaff, Eric (2007): Process of changing to PBL: In E. de Graaff and A. Kolmos eds. Management of Change: implementation of problem-based and project-based learning in engineering. Rotterdam: SENSE Publisher, pp. 31-44.
- Peet, Jan-Dirk, Bijma, Adrienne, Mulder, Karel F (2004): Intertwining sustainable development in engineering courses: A manual for individual interactive approach, International Conference on Engineering Education in Sustainable Development, EESD, Technical University Delft.
- Sterling, Stephen (2004): Sustainable Education: Re-visioning Learning and Change, Green Books, Bristol.

