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# UICEE Centre for Problem-Based Learning (UCPBL)

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Aalborg University has proven to hold a strong position in Problem-Based Learning (PBL) so that an increasing number of universities and engineering schools worldwide are seeking consultancy and cooperation with Aalborg University (AAU) in this matter. Based on this background, a UICEE Centre for Problem-Based Learning (UCPBL) was established in May 2002. This article describes the status, structure and achievements of the UCPBL. The activities include consultancy for university organisations that are changing from traditional models to a PBL concept, the development of staff on organisational, educational and pedagogical levels, a PBL Masters programme and short courses. The UCPBL is involved in re-organising universities in developing countries and focuses on capacity building as an integrated part of the UCPBL's activities. Continuing Professional Development is also a natural task for the centre as one of the various important aspects of university-industry cooperation. The global aspects of the UCPBL and the establishment of a UCPBL's *Global Network on Problem-Based Learning* are presented and discussed in this article.

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## INTRODUCTION

A UICEE Centre for Problem-Based Learning (UCPBL) was inaugurated in May 2002 as a satellite centre of the UNESCO International Centre for Engineering Education (UICEE). Due to many years of experience of using PBL in engineering education, Aalborg University (AAU), Aalborg, Denmark, was chosen to host the UCPBL with its role as a global centre dedicated to Problem-Based Learning (PBL). This has given Aalborg University a leading position among institutions internationally with world's best practice in this field.

This article describes the status and main achievements obtained thus far by the UCPBL. The profile of the UCPBL is presented briefly, and the outcome, as listed in the First UCPBL Annual Report covering the period until the end of the academic year 2002/2003, is presented and discussed.

## THE ORGANISATION OF THE UCPBL

The role, organisation and achievements of the UICEE Centre for Problem-Based Learning was presented at the 6<sup>th</sup> *Baltic Region Seminar on Engineering Education* in Wismar, Germany, in

September 2002 [1].

The UCPBL is now organised with the following Board of Directors (BD):

- Director, Prof. Flemming K. Fink
- Vice-director, Prof. Stig Enemark
- Vice-director, A/Prof. Egon Moesby
- Vice-director, Prof. Anette Kolmos

The Board of Governors (BG) consists of the following persons:

- Prof. Finn Kjærdsdam (Chairman)
- Prof. Zenon J. Pudlowski
- Prof. Fernando J. Jaimes

BD meetings are being convened on a regular basis, and the profile is formed and the main tasks discussed. There has been one meeting between the Board of Directors and the Board of Governors thus far.

Faculty staff at Aalborg University who are, or want to be, active in the UCPBLs' activities can be appointed as members of the UCPBL. Some of these members bring in their own projects to the UCPBL. This activity has not been given too much focus in the

first year of the operation of the UCPBL, but will be of high priority in the coming year.

Two major activities are, and will continue to be, the small staff development courses given at Aalborg University, as well as at different sites around the world, and a Masters Programme. In order to organise this, the UCPBL has established a decentralised management unit under the leadership of Prof. Anette Kolmos. This unit will also be responsible for research activities, such as PhD programmes.

The UCPBL is serviced by two secretariats: one supporting the educational activities and one Secretariat of the Management. The activities are described on the Web, and can be found at <http://ucpbl.org> and contacted at [ucpbl@kom.auc.dk](mailto:ucpbl@kom.auc.dk)

## THE PROFILE OF THE UCPBL

On 27 June 2002, the Board of Directors presented the Profile of the UCPBL to the Board of Governors at a joint meeting in Aalborg (please see <http://ucpbl.org/profile/index.htm>). This presentation was fully accepted and supported by the BG. The presentation described the main objectives of the UCPBL, which are as follows:

- To support PBL interests worldwide;
- To initiate and conduct PBL research;
- To offer consultancy concerning PBL;
- To facilitate PBL in Continuing Engineering Education;
- To develop educational capacity building within relevant engineering sectors;
- To provide a Master of Engineering Education in PBL and offer summer schools.

## SUPPORTING PBL INTERESTS WORLDWIDE

As mentioned earlier, the profile of the UCPBL was later presented at the 6<sup>th</sup> *Baltic Region Seminar on Engineering Education* in Wismar (September 2002) [1], and at *Frontiers in Education (FIE'03)* in Boulder, USA (November 2003) [2].

The UCPBL has received international visitors who want to learn more about the UCPBL, and Aalborg University's way of implementing PBL. These guests represented the following academic institutions:

- Mondragon University, Mondragon, Spain (August 2002);
- Queens University, Kingston, Canada (January 2003);

- Hochschule Didaktik Zentrum der Universitäten des Landes, Baden Württemberg, Germany (April 2003);
- University of South Carolina, Columbia, USA (August 2003);
- Osaka University, Osaka, Japan (December 2003).

## UCPBL'S GLOBAL NETWORK

As one of its major activities, a *Global Network* has been initiated by the UCPBL. The idea to set up such a *Global Network* is to attract organisations that are actively involved in PBL activities. The main objectives are as follows:

- The UCPBL's *Global Network* aims to strengthen the global work on the implementation and further development of Problem-Based, Project-Organised Learning in engineering education and continuing education.
- The UCPBL's *Global Network* is open to all universities and higher educational institutions, using or planning to use PBL in one way or another.
- The UCPBL's *Global Network* will expose and profile the diversities of various PBL concepts in order to encourage an exchange of experience with PBL and to encourage the further development of PBL.
- The UCPBL's *Global Network* seeks to facilitate cooperation between its members regarding PBL related research and staff development, as well as organisational development and curriculum development.

It is envisaged that the UCPBL's *Global Network* will be a major activity in the coming period.

Worldwide activity in Problem-Based Learning and related pedagogical concepts is growing, and there is an increasing interest in learning from these different experiments. So as to give members of the UCPBL's *Global Network* better access to the published results and to the ongoing research activities and educational experiments, the UCPBL has initiated work on establishing a bibliographic database. Members of the UCPBL's *Global Network* will be asked to contribute to this activity, enabling the database to be as complete as possible.

## PBL RESEARCH

Although the main focus of the UCPBL is not research-based, the BD, as university scientific staff

members, will always be involved in research activities. Some of this research will be recognised as a UCPBL activity.

The UCPBL has taken the initiative to apply for a grant from the European Union (EU) 6<sup>th</sup> frame programme, *Lifelong-Engineering*, with partners from the following universities:

- Glasgow Caledonian University, Glasgow, Scotland, UK;
- Université Catholique de Louvain, Leuven, Belgium;
- Delft University of Technology, Delft, the Netherlands;
- University of Aveiro, Aveiro, Portugal;
- Vilnius Gediminas Technical University, Vilnius, Lithuania;
- Tallinn Technical University, Tallinn, Estonia.

The UCPBL will be linked to the EU *Leonado Project: CEE\_as\_WBL* (Continuing Engineering Education as Work Based Learning). The *ELITE Centre for Continuing Engineering Education* at Aalborg University currently manages this project. This two-year project began in September 2003 with partners from the following universities:

- Glasgow Caledonian University, Glasgow, Scotland, UK;
- University of Wales Institute, Cardiff, Wales, UK;
- University of Porto, Porto, Portugal;
- Vienna University of Technology, Vienna, Austria;
- Mondragon University, Mondragon, Spain;
- Helsinki University of Technology, Helsinki, Finland;
- Budapest University of Technology and Economics, Budapest, Hungary.

The main tasks in this project will be as follows:

1. The development of Work Based Learning (WBL) – a Continuing Professional Development (CPD) process based on the interrelationships between tacit and explicit knowledge and advanced knowledge skills;
2. The development of a WBL CPD - process based on experiences gained from PBL;
3. Evaluation and estimation of the needs and possibilities for ICT support in WBL.

A joint research programme, together with the Virtual University at Instituto Tecnológico y de Estudios Superiores de Monterrey, Monterrey, Mexico, concerning Project Oriented Learning in a virtual educational

environment, started in spring 2003. It is envisaged that the project will finish in 2004. There are currently 35 students enrolled in Monterrey and 12 students in Aalborg, working together on this project.

The UCPBL has taken the initiative to develop a study guide for a PBL-based curriculum, focusing on project management, cooperation and PBL learning. The *Danish Pedagogical Network for Engineering Education* finances this project. The project will be finished in 2004.

## PBL CONSULTANCY

It is the mission of the UCPBL to offer its expertise concerning PBL as consultancy services. This is based on the consultants' personal practical experience with processes of change. Integrated in this consultancy are training services that are based on research and developments.

These consultancy services can be offered as initial or overall introductory courses or workshops for organisations considering change, or as advisors for executives in the initial phase of change considerations. It can also be more formalised as long-term or short-term agreements, where the UCPBL staff can work at the institution for a period of time, supervising the process of change at an institutional level, as well as on the operational teacher level.

The staff at the UCPBL have been acting as educational consultants at the following Institutions:

- IEC-POL, Instituto Tecnológico y de Estudios Superiores de Monterrey, Monterrey, Mexico (2001-2003);
- International workshop on PBL/POL, a two-week certification programme for teachers, Aalborg University (June 2002);
- Meetings and a three-day course on PBL implementation at Aalborg University for Mondragon University (August 2002);
- A workshop on an introduction to PBL, Chiang Mai University, Chiang Mai, Thailand (September 2002);
- Introduction to PBL workshop, Muced-I&UA, Kuala Lumpur, Malaysia, (September 2002);
- A workshop for facilitating tutors, Mexico (December 2002);
- A workshop in PBL for executives, Monterrey, Mexico (December 2002);
- A workshop in PBL for executives, Mexico City, Mexico (December 2002);
- A three-day PBL staff development course, Mondragon University, Mondragon, Spain (February 2003);

- An international workshop on PBL/POL for academic directors, with a two-week certification programme, Aalborg University (June 2003);
- A one-week workshop on PBL in Thailand (October 2003);
- A three-day workshop on experiences with PBL at Nijmegen University, Nijmegen, the Netherlands (October 2003);
- A one-week workshop on PBL in Chile (November 2003);
- A two-day presentation on the introduction to PBL in Chile (November 2003).

Negotiations on consultancy programmes are in progress with institutions, national educational development programmes, or as joint programmes in cooperation with international organisations, such as the World Bank, the EU and the United Nations (UN).

### **FACILITATION OF PBL IN CONTINUING ENGINEERING EDUCATION**

The UCPBL has supported the application from ELITE for an EU Leonardo Pilot project on Continuing Engineering Education (CEE) as Work-Based Learning (see above). The main contribution of Aalborg University to this project will be to develop the necessary tools in order to facilitate CEE, based on the AAU experience, with PBL as a special focus for the team facilitator/supervisor.

### **CAPACITY BUILDING**

The UCPBL is involved in a pilot study with the World Bank with the purpose of defining a project, titled the *Enhancement of the Educational Level in Mozambique*, within three state universities in the areas of:

- Urban planning;
- Engineering;
- Business economics.

The pilot study includes four missions to Mozambique and completion is envisaged at the end of 2003. The planned project will run for five years.

Closely related to this work is the organisation of an Aalborg University Development Research and Education Programme (AUDREP). The UCPBL is a member of the AUDREP Committee.

### **MASTER IN PROBLEM-BASED LEARNING**

The UCPBL has initiated its own *Master in Problem-Based Learning* programme in engineering, which is a part-time continuing education programme that is equivalent to one full academic year. The programme has been accepted by the Danish University Rectors Conference and has been forwarded for approval to the Danish Government. The programme is intended to start in 2004.

The UCPBL has applied to the European Union for funding of the development of a Socrates joint European master programme. The application has been accepted for funding. There will be some shared elements between the two Master programmes.

Connected to the Master programmes and other pedagogical programmes, the UCPBL is involved in a European/Canadian exchange programme in cooperation with the PUC (the Staff Development Centre). A five-day start seminar was conducted in February 2003.

### **OTHER ACTIVITIES**

The UCPBL has, in cooperation with the PUC, organised an internal AAU conference on developments of the AAU model. The outcome of this conference will be included in an anthology that will be published *primo* 2004 in book format with approximately 30 contributions.

In cooperation with the Danish Engineering Pedagogical Network (IPN), a Scandinavian conference on Faculty Development was organised in the fall of 2002. The conference had 30 participants from Norway, Sweden, Finland and Denmark. A book comprising papers presented at the conference will be published autumn 2003.

The UCPBL is planning, in cooperation with IPN and the SLP-group, an AAU seminar on PBL and intercultural learning entitled *Integrating Foreign Engineering Students in Project Groups*, in October 2003. This will be a highly specialised seminar on how to teach foreign engineering students on Collaboration, Learning and Project Management (CLP).

### **PUBLICATIONS**

The UCPBL initiated its work by organising and editing a Special Issue of the *Global Journal of Engineering Education*, with a particular focus on engineering education in Denmark [3]. This publication presents different facets of engineering education and

attempts to profile engineering education in Denmark in order to celebrate the establishment of the UICEE activities at Aalborg University, Denmark.

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## BIOGRAPHIES



Prof. Flemming K. Fink is currently Director of Studies in Electronics and Information Technology at Aalborg University, Aalborg, Denmark. He received his MScEE from Aalborg University in 1978. Subsequently, he was a researcher at Odense University and established an educational programme in Digital

Signal Processing at the Engineering College in Odense. Since 1986, he has been with Aalborg University doing research and teaching within speech recognition and digital signal processing. His major research is in auditory modelling, and he has patented a new concept for parametric hearing aids in cooperation with three colleges.

Prof. Fink has been Director of Studies since 1993 and has initiated an internationalisation of the curriculum. He is presently doing research in Continuing Engineering Education as Head of the Centre for Continuing Engineering Education in Electronics and IT (ELITE).

Currently, he is also Director of the UICEE Centre for Problem-Based Learning (UCPBL), a satellite centre of the UICEE. Prof. Fink has published several papers on Problem-Based Learning (PBL), university-industry cooperation and Continuing Professional Development (CPD).

Prof. Fink is member of The National Advisory Board for Technology in Denmark, a Senior Member of the IEEE and represents Aalborg University on several national and international boards.

Prof. Fink received the UICEE Silver Badge of Honour in 2002 for his outstanding contribution to engineering education.



Prof. Finn Kjærdsdam achieved his MSc (Chartered Surveyor) from the Royal Veterinary and Agricultural University, a GradDip (Traffic Planning) from the Technical University of Denmark. He was also awarded a GradDip (Landscape Architecture) and a PhD (Town Planning) from the

Royal Veterinary and Agricultural University. He has gained a DrTechn (Applied Science) from the Nordic Institute for Advanced Urban and Regional Studies/Aalborg University, as well as a GradCert (Educational

Management) from Harvard University.

Prof. Kjærdsdam's professional career has spanned various noteworthy institutions. Initially, he was employed at Percival Nielsen, a chartered surveyor practice (1969-1970). Between 1970 and 1975, he was a research fellow, assistant and associate professor at the Royal Veterinary and Agricultural University, Copenhagen. From 1975 to 1980, he was an associate professor and Head of Department at Aalborg University, before becoming a senior research fellow at the Nordic Institute for Advanced Urban and Regional Studies in Stockholm between 1980 and 1983. He then went on to become Associate Professor at Aalborg University from 1983-1988, before progressing to be a professor in physical planning and Dean of the Faculty of Engineering and Science at Aalborg University (since 1988). He is also a visiting professor in industrial physical planning at Stavanger University College.

He has published widely in the field of urban planning, project innovation and Problem-Based Learning (PBL).

Prof. Kjærdsdam is Chairman of the Danish Engineering Educations Consultation Council, Chairman of the Board of the Danish Centre for Educational Studies in Science and Chairman of the Utzon Centre. He is a member of the Board for the National Foundation for the Advancement of Science, and a bureau member of the International Society of City and Regional Planners, as well as a council member of the Association of European Schools of Planning and a member of the Board of Danish Centre for Industrial Production. He is a Member of Honour and former President of the Danish Association of Town Planners, and an invited member of the German Association of Urban, Regional and State Planners. He is also a member of the Danish Academy of Technical Sciences, the Board of the Biological Bank Denmark Foundation, the Board of Novi Innovation, the Board of Northern Jutland Innovation Forum, and on the Steering Group of the Danish Wind Energy Centre. He is also a Knight of the Order of Dannebrog.

Prof. Kjærdsdam has also been appointed as a Deputy Chairman of the Academic Advisory Board of the UNESCO International Centre for Engineering Education (UICEE). He is also Chairman of the UICEE Centre for Problem-Based Learning, a satellite centre of the UICEE, and is a member of the International Liaison Group for Engineering Education (IL-GEE). He is an Associate Editor of the *Global Journal of Engineering Education*. Prof. Kjærdsdam is also the recipient of the UICEE Silver (2000) and Gold (2002) Badges of Honour for his outstanding contribution to engineering education.