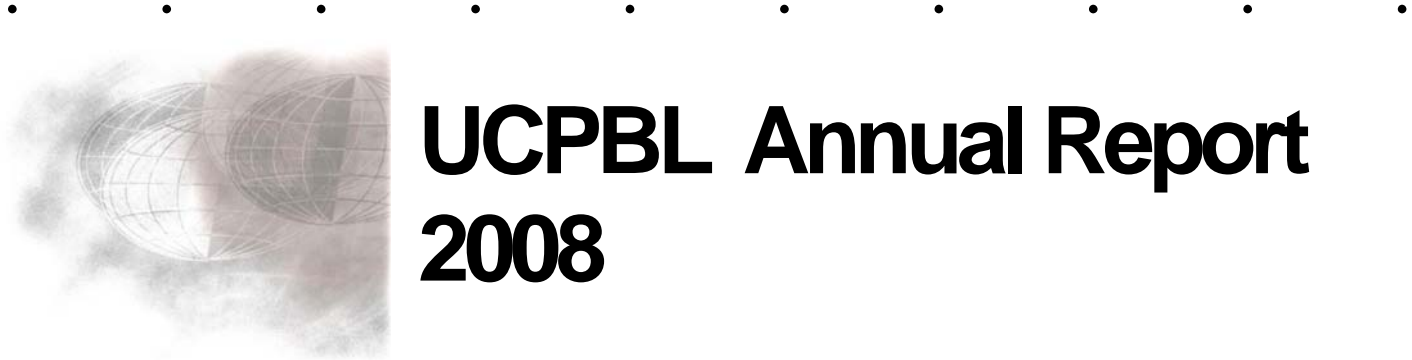




UNESCO CHAIR
PROBLEM BASED LEARNING
AALBORG UNIVERSITY • DENMARK

UNESCO CHAIR for Problem Based Learning



UCPBL Annual Report 2008

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Aalborg University

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1. The Profile of UNESCO CHAIR in Problem Based Learning

The UNESCO Chair for Problem Based Learning (UCPBL) was established 2007 at Aalborg University (AAU). Many of the activities have been prolonged from the previous and now closed UNESCO International Centre for Engineering Education, Centre for Problem Based Learning at Aalborg University. The first two years of activities witness a comprehensive portfolio where we are aiming our objectives. Especially, the emphasis on research has paid off with an impressive list of publications, research projects and enrolment of the first two PhD students.

The overall objective of this UNESCO Chair is to create a global society for researchers and academic staff working with PBL. This includes research and development activities, educational programs, consultancy activities, and the establishment of a global network for international cooperation and exchange of experiences.

The specific objectives are:

- To establish a sustainable global network of individuals and institutions already having or wanting to develop expertise in PBL.
- To establish a research network of active researchers in PBL.
- To develop and run a distance Masters Programme in Problem Based Learning in Engineering and Science (MPBL) open for participants at a global level.
- To disseminate experience gained from current projects concerning implementation of PBL in developing countries.
- To provide possibility for training and consultancy.

The overall profile and the activities of the UCPBL Centre for Problem Based Learning are presented in the work plan that is continually updated and available at: <http://www.ucpbl.net/>

1.2 Organisation of the UNESCO CHAIR

The organisation that was established will be reviewed and further developed during 2009. Due to resources and manpower, there will be established a new structure of the management board and a new organisation of the global network. The intention is that the board will become the working board administrating a project structure for both research and consultancy activities. The management board will consist of the chair and two vice chairs. The structure with the two advisory boards will continue.

UCPBL University Board (UB):

During the year there has been both UCPBL university board meeting March 27, 2008. Members of the board are:

Arne Remmen, Professor, Department of Development and Planning
Børge Lindberg, Associate Professor, Department of Electronics
Flemming K. Fink, Professor, Department of Electronics
Henrik Brohus, Associate Professor, Department of Civil Engineering
Karl Brian Nielsen, Professor, Department of Production
Kim Haugbølle, Research Director, Danish Building Research Institute
Kristian Olesen, Associate Professor, Department of Computer Science
Lise Kofoed, Professor, Department of Technology, Copenhagen
Lone Dirckinck-Holmfeld, Professor, Department of Communication and Psychology
Paola Valero, Associate Professor, Department of Learning
Torben Rosenørn, Head of Department, Department of Technology, Esbjerg

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UCPBL International Board (IB):

During the year, there have been virtual contacts to the international board on advice for the future development of UCPBL. Members of the board are:

Sherra Kerns, Professor, Vice President, Olin College, US
Ulisses Araújo, Professor, University of Sao Paulo, Brazil
Tony Marjoram, Dr., Programme Specialist, UNESCO, France
Richard Felder, Dr., Professor, US
Roger Hadgraft, Director, Associate Professor, RMIT University, Australia
Mikhail Minin, Dr., Professor, Tomsk Polytechnic University, Russia
Pornchai Mongkhonvanit, President, Professor, Siam University, Thailand
Wang Sunyu, Professor, Executive director, Tsinghua University, China

UCPBL Academic Staff (AS):

Anette Kolmos, Chair Holder, Professor
Xiangyun Du, Associate Professor
Jette Egelund Holgaard Associate Professor
Palle Qvist, Associate Professor
Mona Dahms, Associate Professor
Lars Bo Henriksen, Associate Professor
Sidse Høyrup Clemmensen, Research Assistant
Erik de Graaff, Extraordinary Professor

2. PBL Global network

The first Research Symposium on PBL

The UNESCO chair held the first research symposium on PBL in June/July 2008. There were more than 100 participants from 31 countries all over the world.



The PBL symposium addressed two important issues for the future of PBL in engineering education: sustainability and research methodologies. Tony Marjoram, UNESCO Andy Jamison, Aalborg University and Roger Hadgraft, Melbourne University gave keynotes on the relation between PBL and sustainability in engineering and Mariane Frenay, University Catholic Louvain and Denis Bédard, Sherbrook University on research methodologies. All [presentations are accessible from the ucpbl.net](http://ucpbl.net) and there are several interviews with participants in the symposium. There were 27 paper presentations and 18 poster sessions.

In the beginning of 2009, a book with central contributions from this first research symposium will be published. Det Obelske Familiefond has sponsored parts of the first Research Symposium.

The second Research Symposium will be held at Victoria University, Melbourne in the beginning of December 2009.

2.1 Core partners

During the last two years more institutions have established centres for PBL. One of the important tasks for the coming year is to organise the PBL global network on a more solid organisational base. There are institutions that UCPBL already now are working more closely together with.

Beijing Normal University (BNU)

In response to the 'China Strategy' that has been proposed by the Ministry of Science, Technology and Innovation, Denmark early 2008, a collaboration agreement has been signed between Beijing Normal University, China and Aalborg University, Denmark in April, 2008. Based on this agreement, a memorandum of understanding was signed between School of Education (SE), Beijing Normal University (BNU), China and UNESCO PBL Chair in PBL, Aalborg University (AAU), Denmark, which aims to support collaboration in research and education.

A collaboration project was initiated since August, 2008, during the visit of three vice deans of SE, BNU at AAU. The main aims of this project are:

- to bring the inspiration of PBL into higher education in China,
- to broaden the UCPBL practice by getting experiences from China,
- to make contributions to the development of PBL practice worldwide,
- to enhance the internationalization of both sides,

Timeline:

September, 2008 – Spring 2010

Contents of the collaboration project:

Book series publication, research activities and workshops

Publisher: China Higher Education Press

Book 1: Translation book: General introduction to PBL

Book 2: Translation book: staff development for university teaching and learning

Book 3: A new book: Challenges, Possibilities and Strategies of implementing PBL in the Chinese context

Book 3: will include two publications:

- 1) UNESCO Chair in PBL publication (published in SENSE publisher in English),
- 2) Publication in Chinese by China Higher Education Press.

Aims of book 3:

- To develop theoretical research and methodology on PBL in China,
- To conduct empirical study investigating the challenges and possibilities of practicing PBL in China,
- To invite international scholars to write on strategies of developing PBL in China
Two workshops involved to develop book 3
- Workshop 1 Monday, March 2nd, 2009, BNU, China
- Workshop 2: autumn, 2009 Aalborg , Denmark

Victoria University (VU)

VU has as a part of their implementation strategy of PBL established an [Office for Problem Based Learning](#), where they are running both research projects and internal training. Anette Kolmos visited Victoria University late November, 2008.

The PBL-office at VU is running research projects, conferences, seminars and training and there is a close collaboration on the development of the master programme in Problem Based Learning. VU will

host the second symposium on PBL and is initiating closer collaboration among institutions in Australia and New Zealand that are implementing PBL at the institutional level.



Associate Professor Alex Stojcevski, Director, Problem Based Learning Program

2.2 Online resources

In order to provide access to resources, the strategy is to facilitate the PBL Global Network by several online resources. The following online resources have been established:

PBL Global Network Blog site with individual and community blogs. The objective is to facilitate exchange of experiences globally: <http://ucpbl.aau.dk/>

On-line PBL Library with resources from research literature, experts, databases, etc: http://www.ucpbl.net/pbl_library

Relevant publication which can be downloaded on the website <http://www.ucpbl.net> – which will link to VBN website.

Homepage with resources where selected events are accessible as streamed video: <http://www.ucpbl.net/>

3. PBL Research

Several new research projects have been initiated by the UNESCO chair during the year.

Comparing group based and individual assessment

This research project is a study of group based and individual assessment systems. The UNESCO chair has been responsible for a survey among students, staff and external examiners at all three faculties. During 2008 data has been collected and the final reports have been submitted.

Involved staff: Jette Holgaard and Anette Kolmos

Global collaboration - a case study of GENSO project

Together with the Satellite group, the UNESCO chair has studied global collaboration. Through the case of GENSO project, this study intends to understand how a community of practice is designed and established by a group of engineering students from all over the world who are interested and engaged in satellite operations. The cooperation is mainly carried out by online discussion, workshop for face to face meetings, document sharing and a by intensive use of a network based collaborative

environment (tracWiki). Although they are practicing their satellite work in distance from each other, they develop a shared identity through this student satellite project.

Involved staff: Jens Dalsgaard Nielsen, Xiangyun Du and Anette Kolmos

New EU project: PBL as practice based, problem based and project based learning

Budget EUR 40.000.

Institut Technik & Bildung, University of Bremen is coordinator for this new project. The overarching aim is to promote European capability to develop problem based learning (PBL) within Higher Education curricula and related programmes for Continuing Professional Development. The concrete aim is to develop such capability in the selected three fields of expertise (business administration, engineering, TVET teacher education) and with related interest areas for promoting competences (managerial competences, pedagogic competences, competences in HRD).

The objectives of the Euro_net project are the following:

- To create conceptual tools for analysing the models for PBL in different domains and in different countries and present related comparative overviews;
- To develop instruments for analysing the needs and interests related to practice based learning from the learners' and stakeholders' point of view.
- To develop web-based tools and instruments for documenting and supporting the PBL processes and to analyse their usability in different contexts;
- To develop methodologies and support structures for promoting research and studies related to PBL in the respective domains.

Involved staff: Lars Bo Henriksen, Anette Kolmos and Xiangyun Du

For further information on research project run by UCPBL, please visit [overview of research projects from UCPBL](#)

Two new PhD students

Two Chinese PhD students were enrolled since autumn 2008 based on collaboration agreement with two Chinese Universities – Beijing Normal University and North-eastern University. They both work on PBL with case studies in both China and Europe. One is about collaborative innovation and group creativity in PBL, the other is working on organizational change and PBL. They will stay in AAU for 3-4 years to work on their PhD study.

PhD courses:

- Professional communication which is held twice a year.
- PBL and facilitation which was run for the first time autumn 2008.

Research applications

During the year, the UNESCO chair has submitted seven research applications – unfortunately the five with negative response.

Nordforsk

March 2008, coordinator for the Nordic Network on Engineering Education Research. The objectives are to establish Nordic collaboration among Nordic engineering education research in order to improve the level of research, research training and not at least the impact on development of engineering education.

TEMPUS Programme

Coordinator April 2008: Dissemination of Problem-Based Learning in Russia and Belarus with the partners Tomsk Polytechnic University, Belarus State Economic University, Russian Association for Engineering Education, University of Aveiro and University of Delft. Objectives of the project: 1. Train PBL experts at Tomsk Polytechnic University (TPU) and Belarus State Economical University (BSEU) 2. Establishment of Regional PBL Centres' on the basis of TPU and BSEU 3. Implementation of PBL

in TPU and BSEU 4. Promotion and dissemination of PBL among Russian and Belarusian educational establishments.

Partner in TEMPUS project: Postgraduate Education & Research in Engineering, Management and Innovation for Successful Technology Parks and Enterprises in the Central Asia Region with the overall objective to develop and implement innovative education at partner institutions.

Research Council in DK

Engineering Education - Bridging the Gap between Engineering Practice, Engineering Science and Youth Culture. The overall objective of this project is to develop new strategies for educating more and better engineers. The design of the project encompasses four specific objectives: 1. To analyse the weaknesses and strengths of the curricula and learning methods in Danish engineering educations 2. To analyse engineers at work and engineering practice. 3. To analyse the way youngsters nowadays develop a technological culture through their school and everyday experiences; 4. To analyse and develop a conceptual understanding of engineering science.

Global Innovation Lab. Theories, methods and tools for the development of integrated business models for global and sustainable innovation. The overall objective for this project is to develop business models for global and sustainable innovation that in flexible ways integrate ICT, creativity, learning and intercultural collaboration and knowledge building. Many companies face difficulties in global innovation and even if they want to renew their business models (product, customer interface, infrastructure management and finance) during the phases of innovation (idea, concept, prototype and market), there is a general lack of knowledge of how to deal with issues as innovation leadership, ICT, creativity, knowledge building, intercultural learning and collaboration.

New initiatives

Another part of the research strategy is to establish a well organised network within engineering education researcher in order to strengthen the subject domain. Therefore, there have been initiatives to establish a working group within SEFI. The first working group on Engineering Education Research was held at the SEFI annual conference 2008 in Aalborg. There will be a launch seminar for the working group at Aalborg University in February 2009.

4. PBL Education

During 2008, low recruitment to the Master in Problem Based Learning (MPBL) together with a decrease in resources led to the development of a new study regulation for the education. In the new regulations there is much more emphasis on the project, less exams for single subjects and less modules. The new MPBL contains three modules: teaching portfolio, design of MPBL and the master thesis. Module two on design of PBL is offered as a single subject course to institutions that are in the process of changing to PBL and need upgrading academic staff.

In the autumn 2008, there are three participants in the full master programme. The participants are coming from Chile, Colombia and Denmark. Ten participants from Australia on the module two as single subject course and finally there are seven Danish participants in a Danish single subject course on pedagogical strategies.

The homepage has got new layout and been restructured: <http://www.mpbl.aau.dk>

Master in Problem Based Learning in Engineering and Science (MPBL)		
Module 1: Development of Teaching Competences		
Project: Teaching Portfolio	Project unit examination. Internal, individual examination, marked by Passed/Non-passed	15 ECTS
In connection with the project unit a number of subjects are offered, such as: <ul style="list-style-type: none"> • Learning Theories for Engineering and Science Education • Teaching and Learning Models 		
Module 2: Design of PBL Curriculum		
Project: Project work	Project unit examination. Internal, individual examination, marked by 7-step scale	15 ECTS
In connection with the project unit a number of subjects are offered, such as: <ul style="list-style-type: none"> • PBL-models in Engineering and Science Education • Scientific Methods in Engineering • Development of Process Competences • Project Facilitation and supervision 		
Module 3: Master thesis		
Project: Master thesis	Project unit examination External, individual examination, marked by 17-step scale	30 ECTS
In connection with the project unit a number of subjects are offered, such as: <ul style="list-style-type: none"> • Research methods • Intercultural Learning and PBL • Evaluation and Quality Development of Engineering and Science Education • Strategies for Management of Pedagogical Development • Work Based Learning 		

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Module two offered as single subject course started with a new group October, 15. There are ten participants from Victoria University. Anette Kolmos ran a start up workshop, Victoria University, November 27-28



Participants in the MPBL from VU

5. PBL Consultancy Visits

In February 9-17, 2008 professor Lone Dirckinck-Holmfeld and Anette Kolmos visited School of Information Technology, Mae Fah Luang University, Chiang Rai, Thailand. Mae Fah Luang University is a quite new university and there is a strong interest in implementing PBL to some extent in the educational programmes. There will be a delegation visiting Aalborg University in late January 2009



Gp.Capt. Thongchai Yooyativong (Dean of the School of Information Technology), and Miss Nongluk Hwangsanguankij (Lecturer) together with Anette Kolmos and Lone Dirckinck-Holmfeld.

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Example of what could be a Thai group room.

Mona Dahms Universidad Austral de Chile, Valdivia, Chile:
Workshop on Problem Based Learning in Engineering Education. February 27. - March 12.



Mona Dahms at Universidad Austral de Chile

Auckland University of Technology, December 1-5:
Professor Lise Kofoed, Aalborg University and Anette Kolmos visited early December, 2008 Auckland University of Technology (AUT) New Zealand. AUT is seriously considering changing to PBL.



Lise Kofoed and Anette Kolmos at AUT

6. Workshops

Mona Dahms Philipps-Universität Marburg, Tyskland. Workshop on: "Problem-Based Learning in Engineering Education - What? - Why? and How?" February 14

Mona Dahms University of Dar es Salaam, Tanzania. The 4th African Regional Conference on Engineering Education (ARCE-2008): 'Capacity Building in Engineering Education for Sustainable Development'. An invited key note: "Problem Based Learning in Engineering Education - a Development Option for Africa?". A 4-hour workshop on "Problem Based Learning in Engineering Education". April 22. - 25.



Mona Dahms at University of Dar es Salaam

Xiangyun Du held a 2-day workshop on Curriculum change to PBL, at Heilbronn University, Germany April 29-30.

Anette Kolmos, Xiangyun Du and Alex Stojcevski, Victoria University, Melbourne: This workshop was organised as a pre-conference workshop to the SEFI annual conference July 2-5, Aalborg. The workshop on Educational Change towards Problem Based Learning in Engineering Education was held July 2: The objectives of this workshop were:

- to present a range of models for educational change towards Problem Based Learning in Engineering Education
- to facilitate exchange of experiences of change processes among participants.

A staff development workshop was held in Aalborg for 10 staff members from Victoria University July 7-10. Organizers: Xiangyun Du, Anette Kolmos, Mona Dahms, Jette Holgaard, Palle Qvist. Contents of the workshop include both experiences sharing and strategies developing for the further implementation of PBL in VU in the following aspects:

- Setting up PBL projects for students – role of main supervisors (Examples from Electrical and Electronics)
- Establishing a comment first year for engineering and science faculty (what happened in AAU)
- Integration of Communications in PBL project work (SLP courses)
- Physical facilitation,
- Staff collaboration, supervision and co-supervision,
- Integration of math/physics lectures into project work
- Establishing a comment first year for engineering and science faculty (what is happening in AAU)

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- TMS for first year
- Project proposal,
- Arrangement of S course,
- P Course and Project work
- Technical support
- Assessment
- Facilitation
- Reflection on Organizational change towards PBL

Mona Dahms: Centro de Investigaciones y Pruebas Electroenergéticas (CIPEL), Instituto Superior Politécnico José Antonio Echeverría (CUJAE), Cuba. Problem Based Learning Workshops. Evaluation of PBL experiment; preparation of staff for further PBL; preparation of students for PBL. September 15. – 19.

Anette Kolmos and Sherra Kerns, Olin College, USA held workshop Engineering Education: Reformation **7th CeTUSS Workshop** in collaboration with IEEE Nordic Education Society Chapter, September 30 – October 1 2008, Sigtuna, Sweden

Mona Dahms: CMI, AAU-København: PBL workshop for staff at CMI, October 2.

Mona Dahms: University of Dar es Salaam, Tanzania: Discussion and planning of a one week PBL workshop in August 2009. October 13. – 17.

Mona Dahms: American Society of Engineering Education (ASEE) - Global Colloquium, Cape Town, South Africa: Invited paper in Practice session 2: "Does Africa need Problem Based Learning? - Educational Change in Engineering Education". A 3-hour workshop "Problem Based Learning in Engineering Education". October 19. – 23.

Mona Dahms: North West University, Potchefstroom, South Africa: A seminar presentation on "Problem Based Learning - What?, Why? and How?". October 29.

Anette Kolmos ran workshop at University of Western Australia, November 24-26, Late November, 2008 Anette Kolmos visited University of Western Australia for running introduction workshops to Problem Based and Project Based Learning.



Left Professor Nathan Scott, Anette Kolmos and Judith Stallard. Right Professor Ian Reid welcoming

7. Keynotes

Mona Dahms: Philipps-Universität Marburg, Tyskland. In the morning an invited key note to the Ceremony for establishing the Hochschuldidaktisches Netzwerk Mittelhessen: "Establishing a Global PBL Community - the UNESCO Chair in Problem-Based Learning." February 14

Xiangyun Du: Invited keynote speech: PBL and sustainable innovation in engineering education, in *International Conference on Engineering Education (ICEE 2008)*. Budapest, Hungary, July, 2008. <http://icee2008hungary.net/main.php?menu=2>

Anette Kolmos: Keynote lecture: Problem Based Learning, ON QUALITY OF ENGINEERING EDUCATION AND INTERACTION WITH RESEARCH and OF THE EUR-ACE IMPLEMENTATION PROJECT, Faculty of Engineering, Aristotle University of Thessaloniki Greece, August 27-29

Anette Kolmos: Keynote lecture: Problem and Project Based Learning – evidence and new trends: mega-projects and intercultural collaboration, 37-th INTERNATIONAL IGIP SYMPOSIUM, Moscow, September 7-10

Anette Kolmos: Keynote lecture: An Example of a Completely PBL-oriented University, Landesweiter Tag der Lehre, Forschendes Lernen als zeitgemäße Form der Hochschulbildung 14 November 2008, Universität Karlsruhe

8. Participation in conferences

Anette Kolmos, Xiangyun Du, and Jette Holgaard: *SEFI 35th Annual Conference*. Aalborg, Denmark, July, 2008. Paper contribution 1: Nielsen, Jens. D., Du, Xiangyun, and Kolmos Anette. A Knowledge Building approach for learning engineering – A case study of GENSO (student satellite) project. Paper contribution 2: Anette Kolmos & Jette Holgaard: Learning Styles of Science and Engineering Students in Problem and Project Based Education.

Xiangyun Du: *the 7th Asia-Pacific Conference on PBL*. Shenyang, China, July, 2008. Presentation and paper contribution: Kolmos, Anette and Du, Xiangyun. Development of PBL Models and PBL Global Network.

Xiangyun Du: *International Conference on Engineering Education (ICEE 2008)*. Budapest, Hungary, July, 2008. Presentation and paper contribution: Stojcevski, Alex and Du, Xiangyun. Learning Portfolio as an Assessment Method in Problem Based and Project organized Learning.

Xiangyun Du: Du, the Third Sino-Nordic Women Gender Studies Confernece, Kunming, China, Nov 4-7, 2008. Presentation and paper contribution: Xiangyun and Kolmos, Anette. Feminist Pedagogy on Science and Technology Education

Mona Dahms: Goodenough College Bloomsbury, London, UK: An invited presentation to the Assessment of learning outcomes in engineering conference 2008 (ALOE2008): "Assessment of Learning Outcomes in Engineering Education - an International Perspective". November 27.

Mona Dahms, Jette Holgaard, Palle Qvist and Xiangyun Du: First Slotshotel, Aalborg: The 9th Maj-conference on Science, Engineering and Technology Educations, titled Science, Engineering and Technology Educations in Transition - Local and Global Perspectives. Planning and implementation of the conference. December 3. – 4.

9. Visits to Aalborg University

Every year, UCPBL has a lot of visitors. This year, UCPBL has been responsible for organising 12 visits at Aalborg University.

8 January, Linköbing University, Malmö University and Gothenburg University Lars Ove Dahlgren, Madeleine Rohlin, Hans Rystedt

3 April, University of Zaragoza: Iván Lidón López and Ruben Rebollar

7-9 April German-Malaysian Institute, Malaysia: 12 academic staff members from Malaysian Ministry and the German-Malaysian Institute

20-21 May: 6 persons from Beijing University of Technology, China

18 June: Irene Tempone, University of Swinburne, Australia

8 July: Professor Xiping Tao, China National Education Supervisory Board, China

21 August: Zeng Xiaodong, Wang Yan, Ma Jiansheng, Beijing Normal University, China

3 September: Ulrike Jaeger, Heilbronn University, Germany

20 November: 6 persons from Turku University, Finland

26 November: Juny Motoya and Cristina Caurulla, Universidad de los Andes, Colombia

10 December 12 staff members from Shijiazhuang Institute of Railway Technology, China



15 December: Jerzy Szkutnik and Andrzej Kaplon from Czestochowa University and Kielce University

10. Other activities

Audit of the EU project: PBL-Engineering

10-12 November 2008 our PBL-Engineering project was audited by Didier Larose from Moore Stephens LLP, London and Benjamin Couls Rodriguez from the Socrates Monitoring/Amendment, Brussels.

11. Publications

1. [A Knowledge Building approach for learning engineering : a case study of GENSO \(student satellite\) project.](#) / Nielsen, J. Dalsgaard ; [Du, Xiangyun](#) ; [Kolmos, Anette](#). I: Book of Abstracts. Sense Publishers, 2008. s. 105-105 Forskning: Publiceret abstrakt
2. [A Knowledge Building approach for learning engineering : a case study of GENSO \(student satellite\) project.](#) / Nielsen, Jens Dalsgaard ; [Du, Xiangyun](#) ; [Kolmos, Anette](#). 2008. 10 s. Konferencen: 36th SEFI Annual Conference: Quality Assessment Employability and Innovation, nr. 36, Aalborg, Danmark, 2. juli 2008 - 5. juli 2008. Forskning: Conferenceartikel, peer reviewed
3. [Afskaffelse af gruppeeksamen bygger på en misforståelse.](#) / [Kolmos, Anette](#) ; [Holgaard, Jette Egelund](#). I: Ingenioeren. 2008 ; 25.01.2008. Formidling: Tidsskriftsartikel
4. [Constructive Alignment in PBL & Engineering Practice.](#) / Stojcevski, A. ; [Du, Xiangyun](#). I: Proceedings Pre-Conference to the annual SEFI Conference : research Symposium on PBL. Dansk Center for Ingeniøruddannelse, 2008. 8 s. Forskning: Conferenceartikel, peer reviewed
5. [Democratic learning in the Aalborg Model : Participant directed learning in groups.Results from questionnaire surveys.](#) / [Qvist, Palle](#). 2008. 16 s. Konferencen: International Conference PBL 2008, Mexico, 28. januar 2008 - 1. februar 2008. Forskning: Conferenceartikel, peer reviewed
6. [Engineering science and the case of instrumental realism : on realism, instrumental realism and engineering science.](#) / [Henriksen, Lars Bo](#). I: Proceedings Pre-Conference to the annual SEFI Conference : research Symposium on PBL. Dansk Center for Ingeniøruddannelse, 2008. 14 s. Forskning: Conferenceartikel, peer reviewed
7. [Establishing an Innovative Knowledge Community : a case study of \(JEMES\) a Joint European Master in Environmental Studies.](#) / [Nielsen, Eskild Holm](#) ; [Christensen, Per](#) ; [Du, Xiangyun](#). 2008. 10 s. Konferencen: EMSU International Conference, Barcelona, Spanien, 15. oktober 2008 - 17. oktober 2008. Forskning: Conferenceartikel, peer reviewed
8. [Facilitation in a PBL environment.](#) / [Kolmos, Anette](#) ; [Du, Xiangyun](#) ; [Holgaard, Jette Egelund](#) ; [Jensen, Lars Peter](#). Aalborg : Centre for Engineering Education Research and Development, 2008. 78 s. Forskning: Videnskabelig rapport
9. [How to implement active learning? : strategies for change.](#) / de Graaff, Erik ; [Kolmos, Anette](#). I: Designing and implementing an active and equitable engineering education : proceedings of the International Workshop ALE 2008. <Forlag uden navn>, 2008. s. 67-76 Forskning: Conferenceartikel, peer reviewed
10. [Innovation for Engineering Education : problem and Project Based Learning \(PBL\) as an Example.](#) / [Kolmos, Anette](#) ; [Du, Xiangyun](#). I: Innovations 2008 : world Innovations in Engineering Education and Research. red. / Win Aung ; Josef Mecsi ; Jerzy Moscinski ; Ian Rouse ; Peter Willmot. Arlington, USA : Ineer, International Network for Engineering Education and Research, 2008. s. 119-128 Forskning: Bidrag til videnskabelig bog/antologi
11. [Innovative pedagogy for Sustainability.](#) / [Lehmann, Martin](#) ; [Du, Xiangyun](#) ; [Jørgensen, Tine Herreborg](#). I: A new Knowledge Culture : Universities facing global changes for sustainability. 2008. s. 33-45 Forskning: Conferenceartikel, peer reviewed
12. [Learning Portfolio as an Assessment Method in Problem Based and Project Organized Learning.](#) / Stojcevski, Alex ; [Du, Xiangyun](#). I: Abstract Book of the ICEE 2008 Conference. <Forlag uden navn>, 2008. s. 185-185 Forskning: Publiceret abstrakt
13. [Learning Styles of Science and Engineering Students in Problem and Project Based Education.](#) / [Kolmos, Anette](#) ; [Holgaard, Jette Egelund](#). I: Book of Abstracts. Sense Publishers, 2008. s. 69-69 Forskning: Publiceret abstrakt

14. [Learning Styles of Science and Engineering Students in Problem and Project Based Education.](#) / [Kolmos, Anette](#) ; [Holgaard, Jette Egelund](#). 2008. 8 s. Konferencen: 36th SEFI Annual Conference: Quality Assessment Employability and Innovation, nr. 36, Aalborg, Danmark, 2. juli 2008 - 5. juli 2008. Forskning: Conferenceartikel, peer reviewed
15. [Mathematics in Context : Learning University Mathematics through Problems.](#) / [Christensen, Ole Ravn](#) ; [Henriksen, Lars Bo](#). I: Nordisk matematikdidaktikk. 2008 ; Göteborg: Forskning: Artikel, peer reviewed
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