

FACULTAD DE INGENIERIA

# UCPBL ANNUAL REPORT 2017

THE AALBORG CENTRE FOR PROBLEM BASED LEARNING IN ENGINEERING SCIENCE AND SUSTAINABILITY UNDER THE AUSPICES OF UNESCO



THE 6TH  
**IRSPBL 2017**  
JULY 3, 4 & 5

**INTERNATIONAL RESEARCH SYMPOSIUM  
ON PROBLEM-BASED LEARNING**  
PBL, Social Progress and Sustainability



United Nations  
Educational, Scientific and  
Cultural Organization



AALBORG UNIVERSITY

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



UNIVERSIDAD  
**NACIONAL**  
DE COLOMBIA

As of December 2017, the **UCPBL ADVISORY BOARD** consists of the following members:

Chair, Henrik Pedersen, Dean, the Technical Faculty of IT and Design, AAU

Mogens Rysholt, Dean, ENG, AAU

Flavia Schlegel, Assistant Director-General for Natural Sciences, UNESCO

Brian Figaji, former VC Peninsula Technikon, VP Engineering Council South Africa, member UNESCO Ex Board

José Ismael Peña-Reyes, prof., Dean, Nacional Universidad de Colombia

Madam WU, prof., dr., ICEE and Tsinghua University, PR China

Anette Kolmos, Director, Professor, the Aalborg UNESCO Centre, AAU

Henrik Brohus, Head of School of Engineering and Science, AAU

Frede Blaabjerg, Professor, AAU

Tine Herreborg, Head of Department, Dep. of Planning, AAU

Tony Marjoram, Guest Professor, the UCPBL Centre, AAU

Erik de Graaff, Prof., UCPBL, AAU

The Aalborg Centre is very grateful for the support from the Consultancy Committee, which supports activities in all regions of the world. Various activities have been carried out with individual members for the committee.

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This annual report will only report on selected activities.

On our web site **[www.ucpbl.net](http://www.ucpbl.net)** you will find a pdf version of the annual report, containing a more comprehensive portfolio of activities and appendixes including:

Appendix A List of staff and board members

Appendix B List of research projects

Appendix C Participation in Conferences, International Workshops, Seminars and Research Meetings

Appendix D Participation in Invited Keynotes, Lectures and Round Tables

Appendix E Workshops and visits arranged by the Aalborg Centre

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# INTRODUCTION

Over the years, the Aalborg Centre for Problem Based Learning in Engineering, Science and Sustainability under the auspices of UNESCO (Aalborg UNESCO Centre) has organised a global network on PBL in engineering, science and sustainability.

Many of the activities in 2017 have supported this goal.

## IRSPBL 2017 AND 2018

In July 2017, the Aalborg UNESCO Centre and Universidad Nacional de Colombia, Bogotá held the 6th International

Research symposium on PBL with more than 160 registered participants from 22 different countries, discussing all different aspects of researching and practising a PBL curriculum. In connection with the IRSPBL 2017, four books were finished: two Spanish books on PBL theory and PBL cases in South America, a report on innovation in Chile and the research contributions for the symposium which was published in a book.

The Aalborg UNESCO Centre has already taken up the planning for the 7th IRSPBL, which will take place 19-21 October

2018 and is hosted by the only other UNESCO category 2 centre on engineering education, the International Centre for Engineering Education (ICEE), Tsinghua University, Beijing, PR China. During the last couple of years, we have developed a closer relationship with the ICEE and the IRSPBL 2018 is just one of a series of activities. Together with the ICEE, we will co-author and co-edit a chapter for the coming UNESCO Engineering Report 2.

## NEW TRAINING INITIATIVES

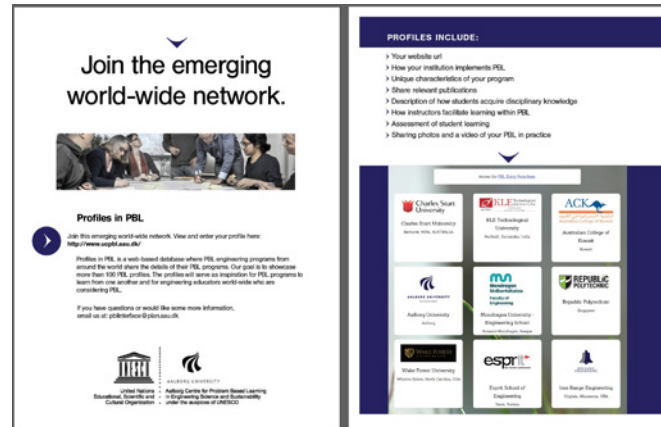
During 2017, we have also developed a more systematic approach to our education and training activities. For some years, we have been running the Master in PBL (MPBL), which is the most comprehensive education and training along with short courses, as workshops on PBL worldwide and visitors' workshops at Aalborg University. We have experienced a need for something in between the two year MPBL program and the shorter courses, which can give credits for the MPBL. This year, we have developed two new programs to fill out the gap:



1) Excellence for educational change – a program for PBL and pedagogy innovation, which has been developed in collaboration with Confucius Institute (CI), Department for Learning at AAU and sponsored by the Chinese Scholarship Council. It consists of a half-year program with training at AAU involving both PBL expertise from the Aalborg UNESCO Centre and the CI and several subject supervisors from science and engineering. The project is part of a bigger research project on training and change of academic staff attitudes to teaching and learning.

2) A five ECTS PBL certificate on Basic PBL offered to institutions and run in a mixed mode. The learning outcomes are to understand basic active learning methodologies, in particular problem and project based learning, curriculum design and students' PBL learning skills. The course is taught in an exemplary manner for the participants to experience active learning and PBL. A pilot test of the course is planned for

Colombian participants during spring 2018 and the certificate will also be offered in India in combination with training on integrated collaborative 3D design and project management by Dassault Systemes, France.



## ONLINE RESOURCES

As part of the Aalborg UNESCO Centre's global activities and part of training, this year we have two new online activities: 1) a free stand alone and 100% online course: the learning outcomes for this course is to present an overview of various PBL models, and 2) a database of PBL universities and programs.

## RESEARCH

During 2017, the Aalborg UNESCO Centre has formed partnerships at the regional, Danish and Nordic levels for more STEM research and activities, which will be strengthened at both the national and Nordic level. In Denmark, STEM will be a core part of the technology pact that the Danish Government has decided on as a mean for meeting the challenges for the future workforce and we have participated in the work for a national STEM strategy. The Aalborg UNESCO Centre also finished a project on engineering in the school with several cases from the region of Northern Jutland, Denmark.

The Aalborg UNESCO Centre has had success with six of the submitted applications during the year: A three-year AAU sponsored project on PBL-Future, which is a cross-faculty research project, DKK 9 mill.; a three-year ERASMUS project on PBL in Africa, DKK 7,5 mill., and another ERASMUS project on training for Industry 4.0, DKK 400.000. A private foundation sponsored project on universitycollaboration with

companies, DKK 170.000. An evaluation project on use of technology in schools in collaboration with a company and sponsored by InnoBoster, DKK 150.000. Finally, a study has been conducted on company use of automation in the northern part of Denmark and the need for new qualification; Labour 4.0. The project is carried out together with Department of Materials and Production, AAU, and has been externally funded from Vækstforum (Regional Development) which main objective is to enhance growth and development in the North Denmark Region 1 mill.

Throughout the year, several other projects have been carried out such a mapping of PBL activities in Tanzania and South Africa, design of a new model of progression of PBL teaching and learning throughout the curriculum, dropout, as well as ongoing research on sustainability in engineering education and mathematics education. 49 research articles have been published and four PhD students have graduated.

### **ADVISORY BOARD AND CONSULTANCY COMMITTEE**

A rotation in our advisory board has been conducted with a deep thank you to the outgoing members; Professor William



Otoo Ellis, Professor Zhong Binglin and Professor Jes Vollertsen. Additionally, a deep welcome to our new members: professor, Madam WU, Dean José Ismael Peña-Reyes and Professor Frede Blaabjerg.

Furthermore, on September 1, we welcomed a new Chair, Dean Henrik Pedersen from the Technical Faculty of IT and Design, AAU, whom we look forward to collaborating with in the following years. In that connection, we have said goodbye to our former Chair and Dean, Eskild Holm Nielsen, with a deep thank you for your support and a very productive collaboration over the years.

Two advisory board meetings have been held with our external and internal

members – one in connection to the IRSPBL 2017 in Bogotá and one ordinary meeting 4 December at our new offices in Rendsburggade.

We will also like to thank our members of the consultative committee. During the year, we have had contact to several members from companies and professional organisations, and we are very grateful for the help and support.

### **ORGANISATION AND STAFF**

During 2017, we have moved to a new location, Rendsburggade 14 DK-9000 Aalborg, where students living out PBL now surround us.



Atrium, Rendsburggade 14

We have undergone a year with adjustments to the new organisation with relations to two technical faculties: Engineering and Science (ENG) and The Technical Faculty of IT and Design (TECH). The TECH faculty hosts the Aalborg UNESCO Centre; however, the centre has responsibilities to both faculties and there will be academic staff responsible for the dialogue with schools and faculties. Additionally, the ENG Dean, Mogens Rysholt Poulsen, is a member of our advisory board to ensure close collaboration in the future.

In the spring of 2017, the Aalborg Centre employed a new associate professor, Søren Frimodt-Møller; three new research assistants: Stine M. Bylov, Nicolaj Riise Clausen and Giajenthiran Velmurugan; a new Postdoc, Lykke B. Bertel, and a new part-time lecturer, Julie Rafn Abildgaard.

We are looking forward to further collaboration with all our partners in 2018.

**A SPECIAL THANK YOU  
TO ALL OUR SPONSORS  
THROUGHOUT 2017:**

- Dassault Systemes
- The Obel Family Foundation
- The faculty of Engineering and Science
- UNESCO
- Vækstforum (Regional Development)
- ERASMUS+ program for Strategic Partnership
- The Danish Anniversary Foundation for Technical Engineering of 1980



# GLOBAL NETWORK

The development of a global network on PBL is one of the core activities of the Aalborg UNESCO Centre. The objectives of the global network are to bring together researchers, teachers, practitioners, companies and policymakers in order to share knowledge and experiences on how to use PBL in the development of engineering and science education. To fulfil these objectives, the Aalborg UNESCO Centre produced, organized and hosted a variety of activities during 2017.

The Universidad Nacional de Colombia (Bogotá, Colombia), together with Aalborg UNESCO Centre, organized and hosted the 6th International Research Symposium on PBL (IRSPBL 2017) from 3-5 July, 2017. This is the first time that the IRSPBL symposium took place in South America and included activities in both English and Spanish. It is our clear policy that we try to be inclusive by reaching and creating conditions for Latin American researchers, teachers and practitioner's participation. PBL, social progress and sustainability was the this edition's theme and included more than 160 registered participants from 22 different countries, 53 papers presentations, 4 pre-

conference workshops, 3 panel sessions and 2 keynotes.

For the first time, the IRSPBL accepted papers in Spanish as a strategy to support the participation of Latin America teachers in IRSPBL. Part of IRSPBL 2017 activities was the launch of two e-books in Spanish. Translated articles about PBL theory and practice compose the first e-book, entitled **Aprendizaje basado en problemas en ingeniería: Teoría y práctica**, while the second e-book, entitled **Aprendizaje basado en problemas y educación en ingeniería: Panorama latinoamericano**, complies examples of best practices in implementing PBL in Latin America. They can be found in the publication list of this report.

We are already planning the next IRSPBL 2018 Symposium. It will be held at Tsinghua University, PR China, on 19-21 October 2018, and it is organized in collaboration with the International Centre for Engineering Education (ICEE), a Category II UNESCO Centre, with theme **Innovation, PBL and competences in Engineering Education**. In May 2017, Anette Kolmos, Aida Guerra, Stine Bylov and Tony Marjoram met with ICEE committee in Beijing, PR China, and started organizing the IRSPBL 2018.





# NEW ONLINE INTRODUCTORY COURSE

[HTTPS://UCPBL.MOODLE.AAU.DK/](https://ucpbl.moodle.aau.dk/)

During spring 2017, we launched a new free online stand-alone course on introduction to PBL .

The need for creating an overview of problem and project based learning (PBL) has increased and the acronym 'PBL' is used for many different curriculum and classroom practices . Thus, as an appetizer to some of our training activities, we decided to create this course . The specific aims of the course are to present the PBL history, including underlying learning theories and learning principles; to present a range of different PBL models from around the world and to introduce theories of educational change to problem based learning .

The course consists of four sessions:

- 1) Introduction to the course, including the background, an overview of course contents, information about the course providers, course aims, and learning outcomes, and some common myths about PBL .
- 2) The differing histories of the two strands of PBL as well as the underlying learning theories and learning principles of PBL .

- 3) A PBL 'Tour de Monde' presenting four different PBL models from universities around the world .

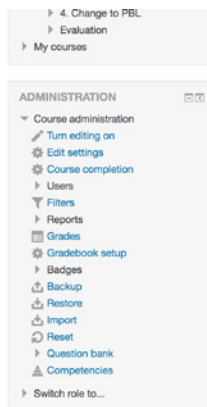
- 4) Strategies of educational change management and examples of processes of change to PBL in universities around the world .

The course is accessed through self-enrolment – and nearly 200 participants have signed up . For full completion, the participants can ask for a certificate.

The course is in process of being translated into Spanish

## ONLINE RESOURCES UNDER CONSTRUCTION

Beside from the online introductory PBL course, two other types of online resources were under construction in 2017: A database to gather institutional PBL profiles and a platform for sharing teaching material for engineering education for sustainability.



### 1. Introduction to the course



In this session, you find a presentation of the course and the course providers as well as a discussion of some of the common myths of PBL.

- Introduction to the course
- Reflections on session 1

### 2. History, theories, and principles of PBL



This session takes you back to the start of problem based learning by presenting the history of PBL. It also presents the learning theories supporting PBL, historically and currently, as well as the learning principles common to many PBL models.



**Republic Polytechnic**  
Singapore



**Australian College of  
Kuwait**  
Kuwait



**Universidad Europea de  
Madrid**  
Villaviciosa de Odón, Madrid, Spain



**KLE Technological  
University**  
Hubballi, Karnataka, India



**RMIT University**  
Melbourne, VIC, Australia



**FACIG**  
Manhuacu / MG - BRAZIL



**Vishwaniketan**  
Mumbai, Maharashtra, India



**Esprit School of  
Engineering**  
Tunis, Tunisia



**Central University of  
Technology**  
Bloemfontein, Free State, South  
Africa



**Central University of  
Technology**  
Bloemfontein, Free State, South



**AALBORG UNIVERSITY  
DENMARK**

**Aalborg University**  
Aalborg



**UNIVERSITI TEKNOLOGI  
MALAYSIA**  
Johor Bahru, Johor, Malaysia

## PBL DATABASE

UCPBL has created a platform for institutions to visualise their approach to PBL in order to get inspired and show the variety of PBL models at the institutional level

The ambition is that the institutions themselves can create a PBL profile, by answering questions, which will clarify the range of the PBL implementation and the way the concept of PBL is transferred into practice from a staff as well as a student perspective.

At the end of 2017, eight engineering education institutions are presented in the database, whereas the last part of the project is to attract more universities and to finalise the user interface

Furthermore, a conceptual platform for sharing material for teachers to foster engineering education for sustainability has been created .

The conceptual platform is based on three pillars:

- raising students awareness of the importance of sustainability in their engineering discipline including video

to explain the role of sustainability in the discipline.

- getting students knowledgeable by sharing resources linking sustainability to their engineering discipline, including overview material and links to relevant material.
- activating students in taking a problem based learning approach to identify, analyze and solve sustainability

challenges in the context of their profession, including real life scenarios, sustainability cases and reflective questions .

The first two cases, interlinking respectively Nano technology and Software engineering to sustainability, will be online during 2018 .

# Sustainability in Engineering

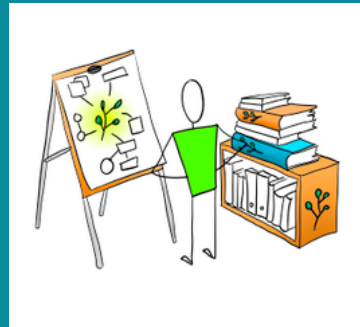


AALBORG UNIVERSITY

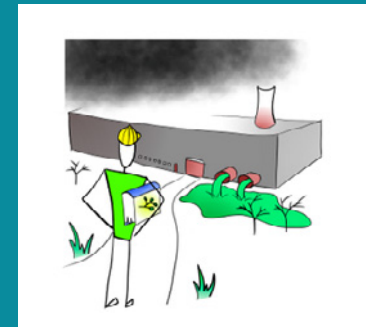
## Getting aware



## Knowing more



## Doing more



# GUIDE TO STUDENT-COMPANY COLLABORATION IN ENGINEERING EDUCATION

The skills expected of tomorrow's engineers and demanded by accrediting institutions and employers are closely related to generic competencies. It is not just about technical skills but also process competencies in design, communication and collaboration as well as competencies support a holistic thinking in the development of new technology.

One of the ways to foster generic competencies is to let students work with authentic real life problems in a company context. This however adds to the challenges of educational design to merge academic and industrial cultures in what could be called a hybrid-learning environment.

By support from the Danish Anniversary Fond for Technical Engineering of 1980, UCPBL set out to make a guide to educational designers and educators in engineering education institutions to support targeted and systematic student-company



collaboration. The guide is based on 16 interviews, of which 12 have been interviews by person and four interviews by telephone. The aim has been to include a broad range of expertise, including educational designers and practitioners, students, employers as well as researchers who have studied education planning related to business projects.

The guide will be published in Danish and English in 2018.

The guide is, on the one hand, an expression of how student-company collaboration can be seen in a PBL perspective, but on the other hand, the guide is also an attempt to highlight diverse practices and perspectives on student-company collaboration. The experiences from practice forms the basis for providing a number of recommendations to the educational framework and the type of student-company collaboration and draws attention to personal, inter-personal and procedural aspects. The recommendations are intended as sources of inspiration, which has to be translated to specific educational contexts. The ambition however remains the same: to improve student-company relations and provide engineers to be with the possibility to grow generic employability competences through company interaction.

# LABOUR 4.0

The overall purpose of the Labour 4.0 project is to support regional industrial companies to become more competent in order to reach their full potential in connection with to Industry 4.0. This must be done by ensuring, that the right skills and competences are present in the companies. In order to ensure this, it will be necessary to identify what competencies are essential in relation to Industry 4.0 and also to understand how companies work strategically to maintain and attract skilled labor. Finally, a methodology must be developed to identify the maturity of the company's 4.0 competency strategy.

## PURPOSE

The aim of the project is to identify which knowledge strategies North Jutland companies applies towards acquiring skills and knowledge about Industry 4.0.



These strategies are expected to address issues such as: What is the need for further training of existing employees? How does the company attract and maintain relevant labor? What knowledge is required for recruitment etc.

The Labour 4.0 project will develop a methodology to identify the maturity of the company's 4.0 competency strategy. The methodology will create three contributions:

1. will be able to analyze and map companies' current competence strategy
2. can point-out concrete initiatives to increase the maturity of companies competence strategy
3. can provide a basis for benchmarking between companies

At the end of the project, the methodology could provide the basis for an effort to dress to Industry 4.0. Based on the results of Labour 4.0, the methodology provides the basis for an effort, which should prepare North Jutland companies and educational institutions in connection with Industry 4.0.

# GRADUATION OF PHD STUDENTS

THE FOLLOWING FOUR PHD STUDENTS DEFENDED AND WERE AWARDED WITH PHD DEGREES:

**Kjell Staffas** from Sweden, with thesis "Developing Requisite Motivation in Engineering Studies";

**Christina Madsen** from Denmark, with thesis "Project logic – the public sector paradox";

**Melissa Andrade-Molina** from Chile, with thesis "(D)effecting the child: The scientification of the self through school mathematics";

**Hashim bin Mohamad** from Malaysia, with thesis "The impact of problem-based learning on students' competencies in technical vocational education and training".

AS WE LOOK FORWARD TO FUTURE COLLABORATION,  
WE THANK ALL OUR PHD STUDENTS  
FOR THE COLLABORATION DURING THEIR STUDIES  
AND WISH YOU ALL THE BEST IN THE FUTURE.



# TRAINING AND DISSEMINATION ACTIVITIES

The Aalborg PBL model inspires educators around the world. Each year, many of them come to visit Aalborg and our centre. In 2017, UCPBL carried out nine visits with participants from more than 15 countries.

Normally twice a year, once during spring and once during autumn, a visitor's workshop is organised to accommodate the needs of these visitors. Several visitors have expressed their satisfaction with these workshops and some have asked for an extended program with more detailed information. Our only Visitor Workshop in 2017 took place on 27-28 March, with participants from Kuwait, Brazil, Italy, Colombia, Vietnam, Lithuania, Israel, Spain, Chile, and Austria. Our spring 2018 workshop will take place on 15-16 March.

Throughout the year, several workshops were held in relation to conferences and by special invitation. Several international invited keynotes were given and UCPBL staff was represented in numerous conferences all over the world – specific details of this are available in the electronic version of this report on our website.



As part of the Aalborg UNESCO Centre's global activities, it is a purpose to develop free online resources. During 2017, the online "Introductory course on PBL in Higher Education" have been launched, consisting of four sessions "Introduction", "History, theories and principles of PBL", "PBL models around the world", and "Change to PBL", with a total of 17 sub-sessions.

For the Chinese Scholarship Council (CSC), we have developed a 6 months course for science teachers from more than 10 universities in China: "Excellence

for Educational Change – A program for PBL and Pedagogy Innovation".

The 35 participants experience a full semester in Aalborg similar to ordinary AAU students, meaning courses and team-based project-organized PBL. The two projects involve observations of teaching and project supervision, interviews with teachers and students, besides data collection among students and staff at their home universities. The expected outcome is new teaching designs inspired by the Aalborg model.

# IRSPBL 2017, BOGOTÁ, COLOMBIA



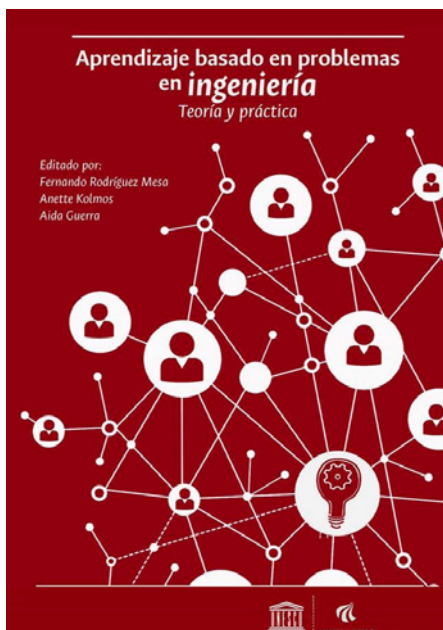
*Pictures by Giajenthiran Velmurugan*





*CSC students graduating, January 2018*

## SELECTED PUBLICATIONS



**Employability and work-related learning activities in higher education : how strategies differ across academic environments.** / Magnell, Marie; Kolmos, Anette.  
In: Tertiary Education and Management, 2017.

**Engineering Mathematics in Context: Learning University Mathematics through Problem Based Learning.** / Ravn, Ole; Henriksen, Lars Bo.  
In: International Journal of Engineering Education, Vol. 33, No. 3, 2017, p. 956-962.

**First-year non-STEM majors' use of definitions to solve calculus tasks: Benefits of using concept image over concept definition?** / Dahl, Bettina.  
In: International Journal of Science and Mathematics Education, Vol. 15, No. 7, 2017, p. 1303-1322.

**Getting a hold on the problem in a problem-based learning environment.** / Holgaard, Jette Egelund; Guerra, Aida; Kolmos, Anette; Petersen, Lone Stub.  
In: International Journal of Engineering Education, Vol. 33, No. 3, 2017, p. 1070-1085.

**Guest Editorial I.** / Arana Arexolaleiba, Nestor ; Guerra, Aida; Kolmos, Anette; de Graaff, Erik; Lima, Rui M.  
In: International Journal of Engineering Education, Vol. 33, No. 3, 2017, p. 940-941.

**Integration of Sustainability in Engineering Education: : Why is PBL an answer?** / Guerra, Aida.  
In: International Journal of Sustainability in Higher Education (Print Edition), Vol. 18, No. 3, 2017, p. 436-454.

**Teacher in a problem-based learning environment : Jack of all trades?** / Dahms, Mona Lisa; Spliid, Claus Christian Monrad; Nielsen, Jens Frederik D.  
In: European Journal of Engineering Education, Vol. 42, No. 6, 2017, p. 1196-1219.

**The construction of teaching roles at Aalborg university centre, 1970-1980.** / F. C. Servant-Miklos, Virginie ; Spliid, Claus Christian Monrad.  
In: History of Education, Vol. 46, No. 6, 21.08.2017, p. 1-22.

# International Journal of **Engineering Education**

"A full list of UCPBL publications  
can be found here  
[www.ucpbl.net/research/publications/](http://www.ucpbl.net/research/publications/)

**The philosophical and pedagogical underpinnings of Active Learning in Engineering Education.** / Christie, Michael; de Graaff, Erik.

In: European Journal of Engineering Education, Vol. 42, No. 1, 02.01.2017, p. 5-16.

**Towards Integrating Realities : Pragmatic Constructivism and Arendt's Theory of Action.** / Henriksen, Lars Bo.

In: Proceedings of Pragmatic Constructivism, Vol. Vol 7, No. 1,1 - 21, Vol. 7, 21.12.2017, p. 4 - 9.

**Aprendizaje basado en problemas y educación en ingeniería : Panorama latinoamericano.** / Guerra, Aida (Editor); Rodríguez-Mesa , Fernando (Editor); González, Fabián Andrés (Editor); Ramírez, Maria Catalina (Editor).

Aalborg : Aalborg Universitetsforlag, 2017. 240 p.

**Aprendizaje basado en problemas en ingeniería : Teoría y práctica.** / Rodríguez-Mesa, Fernando (Editor); Kolmos, Anette (Editor); Guerra, Aida (Editor).

Aalborg : Aalborg Universitetsforlag, 2017. 276 p.

**Developing requisite motivation in engineering studies : A study on a master and bachelor program in electronic engineering at Uppsala University.** / Staffas, Kjell.

Aalborg Universitetsforlag, 2017. 250 p.  
Research output: Ph.D. thesis  
AUB/Library-link

**PBL in Engineering Education : International Perspectives on Curriculum Change.** / Guerra, Aida (Editor); Ulseth, Ron (Editor); Kolmos, Anette (Editor).

Rotherdam : Sense Publishers, 2017. 152 p.  
AUB/Library-link

**- The Impact of Problem-based Learning on Students' Competencies in Technical Vocational Education and Training.** / Mohamad, Hashim Bin.

Aalborg Universitetsforlag, 2017. 358 p.

# APPENDIX A STAFF AND BOARD MEMBERS

## ACADEMIC STAFF



**Anette Kolmos**  
Director, Professor



**Erik de Graaff**  
Professor



**Tony Marjoram**  
Guest Professor



**Paola Valero**  
Professor



**Lars Bo Henriksen**  
Professor



**Andrew Jamison**  
Professor Emeritus



**Ruth Graham**  
Guest Associate  
Professor



**Roger Hadgraft**  
Professor, RMIT,  
Adjunct Professor



**Jette Egelund Holgaard**  
Associate Professor



**Mona-Lisa Dahms**  
Associate Professor



**Bettina Dahl  
Søndergaard**  
Associate Professor



**Pia Bøgelund**  
Associate Professor



**Søren Frimodt Møller**  
Associate Professor



**Claus Spliid**  
Teaching Associate  
Professor



**Aida Guerra**  
Assistant Professor



**Bente Nørgaard**  
Assistant Professor



**Steen Hyldgaard  
Christensen**  
Adjunct Associate  
Professor



**Lykke B. Bertel**  
Postdoc  
Part-time Lecturer



**Asbjørn Bull Jensen  
Romme**  
Part-time Lecturer



**Henrik Worm Routhe**  
Part-time Lecturer



**Julie Rafn Abildgaard**  
Part-time Lecturer



**Nicolaj Riise Clausen**  
Research Assistant/  
PhD Fellow



**Giajenthiran  
Velmurugan**  
Research Assistant



**Stine Bylov**  
Research Assistant

## ACADEMIC STAFF



**Ole Kronvald**  
Collaboration Partner



**Thora Bundgaard  
Sørensen**  
Collaboration Partner



**Verner Larsen**  
Collaboration Partner

## ADMINISTRATIVE STAFF



**Morten Andersen**  
Senior Clerk



**Mia Christensen**  
Senior Secretary

During 2017, the following defended and were awarded with Ph.D. degrees:



**Kjell Staffas**



**Melissa  
Andrade-Molina**



**Christina Madsen**



**Hashim bin Mohamad**

In 2017, the following Ph.D. students are enrolled and writing their thesis:



**Concetta Ianniello**



**Aldo Parra-Sánchez**



**Alex Montecino Muñoz**



**Nicolaj Riise Clausen**

# ORGANISATION

The Aalborg UNESCO Centre is managed by an advisory board supported by a consultative committee and a management board. In 2017, these consisted of the following members:

## Advisory Board:

From 1 January-31 August: Chair, Dean Eskild Holm Pedersen, TECH, AAU

From 1 September – : Chair: Dean Henrik Pedersen, Technical Faculty of IT & Design, AAU

## Representative of UNESCO:

Professor Flavia Schlegel, Assistant Director-General, For Natural Sciences UNESCO

Professor Martiale Z. Kana, Senior Programme Specialist, UNESCO Paris

## UNESCO member states:

Former Vice Chancellor of the Peninsula Technikon, Brian Figaji, Vice President of the Engineering Council of South Africa and member of the UNESCO Executive Board for South Africa  
Dean, Dr. José Ismael Peña Reyes, Faculty of Engineering, National University of Colombia, Bogotá, Colombia  
Professor, Madam Qidi WU, Director of

ICEE, Tsinghua University, Beijing, PR China

## Aalborg University:

Dean, Faculty of Engineering and Science, Mogens Rysholt Poulsen

Head of Department, Tine Herreborg Jørgensen

Head of School, Henrik Brohus

Professor Erik de Graaff

Professor Tony Marjoram

Professor Frede Blaabjerg

Professor Anette Kolmos

## Consultative Committee:

The Aalborg Centre has established a consultative committee involving around

40 wide-ranging specialists in PBL, sustainability, engineering and science education from academia, industry and professional organisations around the world. For the list of members please see: <http://www.ucpbl.net/about/organisation/consultative-committee/>

## Management Committee:

Our internal AAU management committee consists of the leaders of the different task forces and AAU representatives across the engineering and science departments and schools. For members of the Management Committee please see:

<http://www.ucpbl.net/about/organisation/management-committee/>



# APPENDIX B

## LIST OF RESEARCH PROJECTS AT THE CENTRE

PBL FUTURE

ENHANCING ENTREPRENEURSHIP, INNOVATION AND SUSTAINABILITY IN HIGHER EDUCATION IN AFRICA

DEVELOPMENT OF AN INTERDISCIPLINARY CURRICULUM

LABOUR 4.0.

MODELS FOR GROUP FORMATIONS WITHIN PBL

EUROPEAN UNION AND RUSSIA STUDIES

PROCEED TO WORK

INTEGRATION OF SUSTAINABLE DEVELOPMENT IN ENGINEERING EDUCATION

OUTREACH – FROM PRIMARY SCHOOL THROUGH SECONDARY EDUCATION TO CONTINUING EDUCATION – PBL IN LIFE-LONG LEARNING

MATHEMATICS TEACHING AND LEARNING IN HIGHER EDUCATION

INSTITUTIONAL CHANGE STRATEGIES TO PBL AND ESD

EVALUATION OF THE PROJECT EXAM

EVALUATION OF THE AALBORG UNIVERSITY PBL MODEL

GLOBAL COLLABORATION – A CASE STUDY OF GENSO PROJECT

PROJECT MANAGEMENT IN STUDY GROUPS

STUDY ENVIRONMENT IN THE AALBORG MODEL

FOR A MORE DETAILED OVERVIEW,  
PLEASE VISIT:  
[HTTP://WWW.UCPBL.NET/RESEARCH/  
RESEARCH-PROJECTS/](http://www.ucpbl.net/research/research-projects/)

# APPENDIX C

## PARTICIPATION IN INTERNATIONAL CONFERENCES, WORKSHOPS, AND RESEARCH MEETINGS

### **Running a workshop: *Transition of single course PBL to systemic PBL approach***

Date: 23 January

Institution and country: [The University of Sunderland](#), UK

Participants: Anette Kolmos

### **CERME10 – 10th Congress of the European Society for Research**

Mathematics Education

Date: 1-5 February

Institution and country: Institute of Education, DCU, Dublin, Ireland

Participants: Bettina Dahl Søndergaard, Melissa Andrade-Molina, Alex Montecino Muñoz

### **PBL Symposium 2017 – Reshaping the teaching and learning experience**

Date: 5-7 March

Institution and country: [Australian College of Kuwait](#), Kuwait

### **Running a workshop: *Reflection and PBL Competences***

Date: 15-17 March

Institution and country: [Republic Polytechnic Singapore](#)

Participants: Anette Kolmos

### **BIGBANG 2017**

Date: 23 March

Institution and country: Odense Congress Centre, Odense, Denmark

Participants: Annette Grunwald

### **UCPBL Visitor's workshop on PBL**

Date: 27-28 March

Institution and country: UCPBL, AAU, Denmark

Run by UCPBL centre staff

### **The 9<sup>th</sup> International Mathematics Education and Society Conference**

Date: 7-12 April

Institution and country: University of Thessaly, Volos, Greece

Participants: Melissa Andrade-Molina, Alex Montecino Muñoz

### **International Forum on Engineering Education and Engineering Capacity Building for the Future**

Date: 22-26 May

Institution and country: [Tsinghua University](#), Beijing, PR China

Running a workshop: PBL and Challenge Based Learning; Generating problems from engineering challenges

Participants: Anette Kolmos, Aida Guerra, Stine Bylov, Tony Marjoram

### **ETALEE 2017**

Date: 23-24 May

Institution and country: University of Southern Denmark, Denmark

Participants: Jette E. Holgaard

### **DUN 2017**

Date: 30-31 May

Institution and country: Danish Network for Educational Development, Denmark

Participants: Claus Spliid



### **EUCEN 2017**

Date: 7-9 June

Institution and country: eucen general assembly, Mainz, Germany

Participants: Bente Nørgaard

### **ITS21**

Date: 13-14 June

Institution and country: Uppsala University, Sweden

Participants: Claus Spliid

### **ASEE 2017**

Date: 25-28 June

Institution and country: Ohio, USA

Participants: Bettina Dahl Søndergaard

### **6<sup>th</sup> International Research Symposium on PBL – IRSPBL'17**

Date: 3-5 July

Institution and country: Nacional Universidad de Columbia, Bogotá, Colombia

Participants: Anette Kolmos, Aida Guerra, Claus Spliid, Mona-Lisa Dahms, Tony Marjoram, Stine Bylov, Giajenthiran Velmurugan, Morten Andersen

### **REES**

Date: 6-8 July

Institution and country: Universidad de los Andes, Colombia

Running workshops: PBL Models and change Strategies; PBL: design and manage projects

Participants: Anette Kolmos, Aida Guerra, Claus Spliid

### ***Running a workshop: PBL-design and manage projects***

Date: 17 July

Institution and country: [IDEA Centre, University of Minho, Portugal](#)

Participants: Aida Guerra

### ***CSC – 35 Chinese staff, received six months training on PBL at AAU***

Date: 1 August 2017-31 January 2018

Institution and Country: the Aalborg UNESCO Centre, AAU Denmark

Participants: Anette Kolmos, Claus Spliid, the Confucius Institute and AAU

### **ECER 2017**

Date: 21-22 August

Institution and country: Copenhagen University, Denmark

Participants: Concetta Ianniello

### **EARLI – JURE 2017 CONFERENCE**

Date: 27-28 August

Institution and country: Tampere University, Finland

Participants: Concetta Ianniello

### **SEFI**

Date: 17-22 September

Institution and country: Institute Superior de Engenharia de Porto, Azores, Portugal

Running workshops: SEFI WG workshop

Participants: Anette Kolmos, Aida Guerra, Bente Nørgaard, Nicolaj Riise Clausen

### ***Kick off meeting – the writing of the UNESCO Engineering Report 2***

Date: 25-28 September

Institution and country: Tsinghua University, Beijing, China

Participants: Anette Kolmos

**Annual Visiting Professors Conference  
2017 – What is excellent teaching?**

Date: 26-27 September

Institution and country: Royal Academy of  
Engineering, UK

Participants: Mona-Lisa Dahms,  
Gajenthiran Velmurugan



**Kick-off meeting, ALTEF project**

Date: 9-10 October

Institution and country: Sustanium,  
Berlin, Germany

Participants: Bente Nørgaard, Claus  
Spliid

**Engineering in School**

Date: 7 November

Institution and country: Aarhus, Denmark  
Participants: Annette Grunwald

**World Engineering Education Forum**

Date: 13-16 November

Institution and country: [WEEF - Malaysia](#)

Panel presentation: Change strategies  
Participants: Anette Kolmos



# APPENDIX D INVITED KEYNOTES, LECTURES AND ROUND TABLES

**Invited Keynote:**

***PBL, History, evidence and cases***

Date: 5-7 March

Institution and country: [PBL symposium, Australian College of Kuwait, Kuwait](#)

Anette Kolmos, Ron Ulseth

**Invited Keynote:**

***Evidence of Problem and Project Based Learning***

Date: 22-23 May

Institution and country: [International Forum on Engineering Education and Engineering Capacity Building for the Future, Tsinghua University, Beijing, PR China](#)

Anette Kolmos

**Invited Keynote:**

***The study approaches of university students in a calculus class***

Date: 26-27 May

Institution and country: Teaching and Learning Mathematics: 6th Scientific Colloquium Mathematics and Children, Croatia

Bettina Dahl Søndergaard

**Invited Keynote:**

***Where are the barriers and opportunities for good school-business cooperation?***

Date: 1 June

Institution and country: Natural Sciences Coordinator Meeting, Astra, Denmark  
Annette Grunwald

**Invited Keynote:**

***Welcome and IRSPBL History***

Date: 3 July

Institution: [IRSPBL'17](#), Universidad de Colombia, Bogotá, Colombia  
Anette Kolmos

**Invited Keynote:**

***The Aalborg PBL Model***

Date: 17 July

Institution and country: [IDEA, University of Minho, Portugal](#)

Aida Guerra

**Invited Keynote:**

***Transforming and sustaining change in Higher Education for Industry 4.0***

Date: 13-16 November

Institution and country: [World Engineering Education Forum, Malaysia](#)

Anette Kolmos

**Invited Keynote:**

***Taxonomy tools in mathematics***

Date: 6 December

Institution and country: Seminar for mathematics supervisors, Frederiksberg municipality, Denmark  
Bettina Dahl Søndergaard

# APPENDIX E WORKSHOPS AND VISITS ARRANGED BY THE AALBORG UNESCO CENTRE

During 2017, Aalborg Centre academic staff organized and ran several workshops on PBL, Engineering Education and Sustainability. Some of these workshops were run in Aalborg while others were invited workshops and run outside of Aalborg and in collaboration with other organizations, namely in internal conferences.

## WORKSHOPS:

### **Teacher Roles and Facilitation Skills**

Date: 5-7 March

Institution and Country: Australian  
College of Kuwait, Kuwait

Run by: Anette Kolmos, Ron Ulseth

### **Reflection and PBL Competences**

Date: 15-17 March

Institution and country: RP Singapore

Run by: Anette Kolmos

### **UCPBL Visitors' Workshop – spring 2017**

Date: 27-28 March

Institution and Country: Aalborg UNESCO  
Centre, AAU, Denmark

Run by: Aalborg centre staff

### **Workshop on PBL and Challenge Based Learning; Generating problems from engineering challenges**

Date: 22-26 May

Institution and country: Tsinghua  
University, PR China

Run by: Anette Kolmos, Aida Guerra, Tony  
Marjoram

### **PBL Models and change Strategies; PBL: design and manage projects**

Date: 6-8 July

Institution and country: REES,  
Universidad de los Andes, Colombia  
Participants: Anette Kolmos, Aida Guerra,  
Claus Spliid

### **SEFI WG workshop**

Date: 17-22 September

Institution and country: Institute Superior  
de Engenharia de Porto, Azores, Portugal

Run by: Bente Nørgaard

## VISITS AT THE AALBORG UNESCO CENTRE

Every year, the Centre hosts visitors. This year, we have been responsible for organizing 9 visits at the Aalborg Centre:

<b>DATES</b>	<b>INSTITUTION, COUNTRY</b>
<b>22 Februar - 3 March</b>	Itasca Community College, USA
<b>27-28 March</b>	Visitor's Workshop: Australian College of Kuwait, Kuwait Ecole polytechnique fédérale de Lausanne, Switzerland Sunway University, Malaysia Universidad de Santiago de Chile, Chile Technische Hochschule Mittelhessen (THM), University of Applied Sciences, Germany University of KwaZulu-Natal, South Africa University of the Free State, South Africa Aalborg University, Denmark
<b>24 April</b>	Universiti Teknologi PETRONAS, Malaysia
<b>3 May</b>	UTEC University of Engineering Technology, Peru
<b>30 May</b>	Kwame Nkrumah University of Science and Technology (KNUST), Ghana
<b>28-30 June</b>	Republic Polytechnic, Singapore
<b>18 September</b>	University of Sao Paulo, Brazil
<b>25-28 September</b>	University of Genoa, Italy
<b>3-5 December</b>	UCPBL advisory board meeting: PR China, Colombia, Australia, South Africa, France, Denmark

# APPENDIX F PUBLICATIONS

1. [\*\*A bottom-up strategy for establishment of EER in three Nordic countries : the role of networks.\*\*](#) / Edström, Kristina; [Kolmos, Anette](#); Malmi, Lauri; Bernhard, Jonte; Andersson, Pernille. In: [European Journal of Engineering Education](#), 2017. Research output: Journal article Published
2. [\*\*Actitudes de los estudiantes frente a los exámenes grupales en el aprendizaje basado en proyectos en dos programas de ingeniería.\*\*](#) / [Dahl, Bettina](#); [Kolmos, Anette](#). Aprendizaje basado en problemas en ingeniería: Teoría y práctica. ed. / Fernando Rodriguez-Mesa; Anette Kolmos; Aida Guerra. Aalborg : Aalborg Universitetsforlag, 2017. p. 183-208. Research output: Book chapter Published
3. [\*\*Alcanzando el cambio curricular en la educación de la ingeniería.\*\*](#) / [Kolmos, Anette](#). Aprendizaje basado en problemas en ingeniería: Teoría y práctica. ed. / Fernando Rodriguez-Mesa ; Anette Kolmos; Aida Guerra. Aalborg : Aalborg Universitetsforlag, 2017. p. 257-263. Research output: Book chapter Published
4. [\*\*Aprendizaje basado en problemas en ingeniería : Teoría y práctica.\*\*](#) / Rodriguez-Mesa, Fernando (Editor); [Kolmos, Anette](#) (Editor); [Guerra, Aida](#) (Editor). Aalborg : Aalborg Universitetsforlag, 2017. 276 p. Research output: Anthology Published
5. [\*\*Aprendizaje basado en problemas y educación en ingeniería : Panorama latinoamericano.\*\*](#) / [Guerra, Aida](#) (Editor); Rodriguez-Mesa , Fernando (Editor); González, Fabián Andrés (Editor); Ramírez, Maria Catalina (Editor). Aalborg : Aalborg Universitetsforlag, 2017. 240 p. Research output: Anthology Published
6. [\*\*Características del aprendizaje basado en problemas.\*\*](#) / [de Graaff, Erik](#); [Kolmos, Anette](#). Aprendizaje basado en problemas en ingeniería: Teoría y práctica. ed. / Fernando Rodriguez-Mesa; Anette Kolmos; Aida Guerra. Aalborg : Aalborg Universitetsforlag, 2017. p. 24-39. Research output: Book chapter Published

7. **Conceptualising first-year engineering students' problem-oriented work within the context of their study programme : exemplified by studies in Denmark and Brazil.** / [Nørgaard, Bente](#); Araújo, Ulisses ; [Grunwald, Annette](#); Garbin, Monica.  
6th International Research Symposium on PBL: PBL, Social Progress and Sustainability. Aalborg Universitetsforlag, 2017. p. 325 – 337.  
Research output: Article in proceeding  
Published
8. **Control del problema en un entorno de PBL.** / [Holgaard, Jette Egelund](#); [Petersen, Lone Stub](#); [Guerra, Aida](#) (Editor); [Kolmos, Anette](#) (Editor).  
Aprendizaje basado en problemas en ingeniería: Teoría y práctica. ed. / Fernando Rodriguez-Mesa; Anette Kolmos; Aida Guerra. Aalborg Universitetsforlag, 2017. p. 130-167.  
Research output: Book chapter  
Published
9. **Control de proyectos y procesos en el modelo del PBL de Aalborg.** / [Spliid, Claus Christian Monrad](#).  
Aprendizaje basado en problemas en ingeniería: Teoría y práctica. ed. / Fernando Rodriguez-Mesa; Kolmos, Anette ; Aida Guerra. Aalborg : Aalborg Universitetsforlag, 2017. p. 168-182.  
Research output: Book chapter  
Published
10. **Developing Creativity among Engineering Design Students.** / Rodríguez-Mesa, F. J ; [Nørgaard, Bente](#); [Zhou, Chunfang](#); Peña, J. I. .  
45th SEFI Conference. SEFI: European Association for Engineering Education, 2017. p. 237.  
Research output: Article in proceeding  
Published
11. **Developing requisite motivation in engineering studies : A study on a master and bachelor program in electronic engineering at Uppsala University.** / [Staffas, Kjell](#).  
Aalborg Universitetsforlag, 2017. 250 p.  
Research output: Ph.D. thesis  
Published
12. **Diversidad del PBL : Principios y modelos de aprendizaje.** / [Kolmos, Anette](#); [de Graaff, Erik](#); [Du, Xiangyun](#).  
Aprendizaje basado en problemas en ingeniería: Teoría y práctica. ed. / Fernando Rodriguez-Mesa; Anette Kolmos; Aida Guerra. Aalborg Universitetsforlag, 2017. p. 39-57.  
Research output: Book chapter  
Published
13. **Employability and work-related learning activities in higher education : how strategies differ across academic environments.** / Magnell, Marie; [Kolmos, Anette](#).  
In: [Tertiary Education and Management](#), Vol. 23, No. 2, 2017, p. 103-114.  
Research output: Journal article  
Published

14. **Empowering students to co-construct the PBL environment.** / [Holgaard, Jette Egelund](#); [Dahms, Mona Lisa](#); [Kolmos, Anette](#); [Guerra, Aida](#).  
6th International Research Symposium on PBL: PBL, Social Progress and Sustainability. Aalborg Universitetsforlag, 2017. p. 386 – 398.  
Research output: Article in proceeding  
Published
15. **Engineering : meget mere end praktiske løsninger på praktiske problemer.** / [Kolmos, Anette](#); [Grunwald, Annette](#).  
In: [Mona](#), Vol. 3, 09.2017, p. 91-94.  
Research output: Comment/debate  
Published
16. **Engineering grand challenges and the attributes of the global engineer : a literature review.** / [Guerra, Aida](#); [Ulseth, Ron](#); [Jonhson, Bart](#); [Kolmos, Anette](#).  
Proceedings of the 45th SEFI Annual Conference 2017: Education Excellence for Sustainability. ed. / José Carlos Quadrado; Jorge Bernardino; Joao Rocha. Belgium : SEFI: European Association for Engineering Education, 2017. p. 1222-1235.  
Research output: Article in proceeding  
Published
17. **Engineering Mathematics in Context : Learning University Mathematics through Problem Based Learning.** / [Ravn, Ole](#); [Henriksen, Lars Bo](#).  
In: [International Journal of Engineering Education](#), Vol. 33, No. 3, 2017, p. 956-962.  
Research output: Journal article  
Published
18. **Enseñanza de competencias de proceso en un currículo con PBL.** / [Kofoed, Lise Busk](#); [Hansen, Søren](#); [Kolmos, Anette](#).  
Aprendizaje basado en problemas en ingeniería: Teoría y práctica. ed. / Fernando Rodriguez-Mesa; Anette Kolmos; Aida Guerra. Aalborg : Aalborg Universitetsforlag, 2017. p. 88-107.  
Research output: Book chapter  
Published
19. **Faculty perspectives on the inclusion of work-related learning in engineering curricula.** / [Magnell, Marie](#); [Geschwind, Lars Allan](#); [Kolmos, Anette](#).  
In: [European Journal of Engineering Education](#), Vol. 42, No. 6, 2017, p. 1038-1047.  
Research output: Journal article  
Published



20. **First-year non-STEM majors' use of definitions to solve calculus tasks : Benefits of using concept image over concept definition?** / [Dahl, Bettina](#).  
In: [International Journal of Science and Mathematics Education](#), Vol. 15, No. 7, 2017, p. 1303–1322.  
Research output: Journal article  
Published
21. **FRAFALD OG FASTHOLDELSE 2017.** / [Bøgelund, Pia](#); [Velmurugan, Giajenthiran](#); [Bylov, Stine Møller](#); [Justesen, Kaja](#).  
2017. 49 p.  
Research output: Report  
Published
22. **From directive to inquiry-based facilitation of engineering student-groups' projects : A case-study of changing facilitation practice in a project-organized and problem-based learning environment .** / [Spliid, Claus Christian Monrad](#).  
2017. Abstract from Its21, Conference, Sweden.  
Research output: Conference abstract for conference  
Published
23. **From earth to heaven : formats to allow adult learners to combine working, living and learning.** / [Schrey-Niemenmaa, Katriina](#) ; [Nørgaard, Bente](#); [Sjoer, Ellen](#).  
49th Eucen Conference on "ULLL AND THE LABOUR MARKET IN EUROPE: THE CONTRIBUTION OF CONTINUING EDUCATION AND VOCATIONAL EDUCATION TO THE CHALLENGES OF CHANGING WORK AND QUALIFICATIONS REQUIREMENTS. Johannes Gutenberg-Universität Mainz , 2017.  
Research output: Article in proceeding  
Published
24. **Gestión de cambio al PBL.** / [Kolmos, Anette](#); [de Graaff, Erik](#).  
Aprendizaje basado en problemas en ingeniería: Teoría y práctica. ed. / Fernando Rodriguez-Mesa; Anette Kolmos ; Aida Guerra. Aalborg : Aalborg Universitetsforlag, 2017. p. 230-246.  
Research output: Book chapter  
Published
25. **Getting a hold on the problem in a problem-based learning environment.** / [Holgaard, Jette Egelund](#); [Guerra, Aida](#); [Kolmos, Anette](#); [Petersen, Lone Stub](#).  
In: [International Journal of Engineering Education](#), Vol. 33, No. 3, 2017, p. 1070-1085.  
Research output: Journal article  
Published
26. **Guest Editorial I.** / [Arana Arexolaleiba, Nestor](#) ; [Guerra, Aida](#); [Kolmos, Anette](#); [de Graaff, Erik](#); [Lima, Rui M.](#)  
In: [International Journal of Engineering Education](#), Vol. 33, No. 3, 2017, p. 940-941.  
Research output: Editorial  
Published

27. **[Historia del aprendizaje basado en problemas y proyectos.](#)** / de Graaff, Erik; Kolmos, Anette.  
Aprendizaje basado en problemas en ingeniería: Teoría y práctica. ed. / Fernando Rodríguez-Mesa; Anette Kolmos; Aida Guerra. Aalborg : Aalborg Universitetsforlag, 2017. p. 12-24.  
Research output: Book chapter  
Published
28. **[IACEE Porto Declaration : A Global Challenge for Engineers.](#)** / Soeiro, Alfredo ; [Nørgaard, Bente](#); Scalzo, Kim A. .  
2017 ASEE International Forum. American Society for Engineering Education, 2017. 20771.  
Research output: Article in proceeding  
Published
29. **[Impact of PBL and company interaction on the transition from engineering education to work.](#)** / [Kolmos, Anette](#); [Holgaard, Jette Egelund](#).  
6th International Research Symposium on PBL: PBL, Social Progress and Sustainability. Aalborg Universitetsforlag, 2017. p. 87 – 98 .  
Research output: Article in proceeding  
Published
30. **[Integration of Sustainability in Engineering Education : Why is PBL an answer?](#)** / [Guerra, Aida](#).  
In: [International Journal of Sustainability in Higher Education](#) (Print Edition), Vol. 18, No. 3, 2017, p. 436-454.  
Research output: Journal article  
Published
31. **[La discusión en los grupos de proyecto del PBL : construcción de aprendizaje y gestión.](#)** / [Spliid, Claus Christian Monrad](#).  
Aprendizaje basado en problemas en ingeniería: Teoría y práctica. ed. / Fernando Rodríguez-Mesa ; Anette Kolmos ; Aida Guerra. Aalborg Universitetsforlag, 2017. p. 108-130.  
Research output: Book chapter  
Published
32. **[La facilitación en un entorno de PBL.](#)** / [Kolmos, Anette](#); [Du, Xiangyun](#); [Holgaard, Jette Egelund](#); [Jensen, Lars Peter](#).  
Aprendizaje basado en problemas en ingeniería: Teoría y práctica. ed. / Fernando Rodríguez-Mesa; Anette Kolmos; Aida Guerra. Aalborg : Aalborg Universitetsforlag, 2017. p. 58-88.  
Research output: Book chapter  
Submitted

33. [Learning and assessing PBL skills at Aalborg University : A case study.](#) / Kolmos, Anette; Bøgelund, Pia; Spliid, Claus Christian Monrad. Wiley Handbook of PBL. Wiley, 2017. Research output: Book chapter Published
34. [Los cambios hacia el PBL : Lecciones aprendidas.](#) / Guerra, Aida (Editor); Rodriguez-Mesa, Fernando (Editor); González, Fabián Andrés (Editor). Aprendizaje basado en problemas y educación en ingeniería: Panorama latinoamericano. ed. / Aida Guerra; Fernando Rodriguez-Mesa; Fabián Andrés González; Maria Catalina Ramírez. Aalborg Universitetsforlag, 2017. p. 212-225. Research output: Book chapter Published
35. [Læring i Virkeligheden - Praksisnære undervisningsnetværk til styrkelse af folkeskoleelevers interesse for klima og naturfag : Rapport 1 - Praksiseksempler.](#) / Grunwald, Annette. Aalborg Universitet, 2017. 119 p. Research output: Report Published
36. [Læring i Virkeligheden - Praksisnære undervisningsnetværk til styrkelse af folkeskoleelevers interesse for klima og naturfag : Rapport 2 - Barrierer, muligheder og værktøjer.](#) / Grunwald, Anette. 2017. 66 p. Research output: Report Published
37. [Mathematics students' attitudes to group-based project exams compared to students in science and engineering.](#) / Dahl, Bettina. Proceedings of the Tenth Congress of the European Society for Research in Mathematics Education (CERME10, February 1-5, 2017). ed. / Thérèse Dooley; Ghislaine Gueudet. Dublin, Ireland: DCU Institute of Education and ERME : Congress of European Research in Mathematics Education, 2017. p. 3468-3475. Research output: Article in proceeding Published
38. [Part-time Engineering Master Programmes : Implementing Real-life Engineering Problems as a Means of Learning.](#) / Nørgaard, Bente. Proceedings of the 45th SEFI Annual Conference: Education Excellence for Sustainability. ed. / José Carlos Quadrado; Jorge Bernardino; Joao Rocha. SEFI: European Association for Engineering Education, 2017. Research output: Article in proceeding Published
39. [PBL and Engineering Curriculum Change in Latin America : 10 examples and the lessons learned.](#) / Guerra, Aida; Rodriguez-Mesa, Fernando ; González, Fabián . 6th International Research Symposium on PBL: PBL, Social Progress and Sustainability. Aalborg Universitetsforlag, 2017. p. 268 – 278. Research output: Article in proceeding Published

40. **PBL CURRICULUM STRATEGIES : From Course Based PBL to a Systemic PBL Approach.** / [Kolmos, Anette](#).  
PBL in Engineering Education: International Perspectives on Curriculum Change. ed. / Aida Guerra; Ronald Ulseth; Anette Kolmos. Sense Publishers, 2017. p. 1-12.  
Research output: Book chapter  
Published
41. **PBL in Engineering Education : International Perspectives on Curriculum Change.** / [Guerra, Aida](#) (Editor); [Ulseth, Ron](#) (Editor); [Kolmos, Anette](#) (Editor).  
Rotherdam : Sense Publishers, 2017. 152 p.  
Research output: Anthology  
Published
42. **PBL, Social Progress and Sustainability.** / [Guerra, Aida](#) (Editor); [Rodríguez, Fernando José](#) (Editor); [Kolmos, Anette](#) (Editor); [Reyes, Ismael Pena](#) (Editor).  
1. ed. Aalborg : Aalborg Universitetsforlag, 2017.  
Research output: Anthology  
Published
43. **Perspectives on Engineering Curriculum Change.** / [Guerra, Aida](#); [Ulseth, Ron](#).  
PBL in Engineering Education: International Perspectives on Curriculum Change. ed. / Aida Guerra; Ron Ulseth; Anette Kolmos. Rotherdam : Sense Publishers, 2017. p. 119-134.  
Research output: Book chapter  
Published
44. **Premisas para cambio a PBL.** / [Kolmos, Anette](#).  
Aprendizaje basado en problemas en ingeniería: Teoría y práctica. ed. / Fernando Rodríguez-Mesa; Anette Kolmos; Aida Guerra . Aalborg : Aalborg Universitetsforlag, 2017. p. 247-256.  
Research output: Book chapter  
Published
45. **Principios de aprendizaje y organización curricular en el PBL.** / [Guerra, Aida](#); [Rodríguez Mesa, Fernando](#); [González, Fabián Andrés](#).  
Aprendizaje basado en problemas y educación en ingeniería: Panorama latinoamericano. ed. / Aida Guerra; Fernando Rodríguez-Mesa; Fabián Andrés González; María Catalina Ramírez. Aalborg Universitetsforlag, 2017. p. 2-18.  
Research output: Book chapter  
Published

46. **Problem-Based Learning, Engineering and Technology for Sustainable Human Development.** / [Marjoram, Tony](#).  
6th International Research Symposium on PBL: PBL, Social Progress and Sustainability. Aalborg Universitetsforlag, 2017. p. 1-11.  
Research output: Article in proceeding  
Published
47. **PROCEED-2-WORK Nyuddannede ingeniørers erfaring med overgang fra uddannelse til arbejdsliv : Arbejdsrapport nr. 3.** / [Kolmos, Anette](#); [Koretke, Rene Bonde](#).  
UNESCO, 2017. 52 p.  
Research output: Report  
Published
48. **Project Supervisors' Views of a Group Based Project Exam for Engineering Students in a Problem-Based Learning Curriculum.** / [Dahl, Bettina](#).  
Paper presented at 124th ASEE Annual Conference & Exposition, ASEE International Forum, Columbus, Ohio, USA. American Society for Engineering Education, 2017.  
Research output: Article in proceeding  
Published
49. **Projektets Logik - Den Offentlige Sektors Paradoks : Et studie af tværgansatoriske projektprocesser og samskabelse med frivillige i en nordjysk ungdomsskole.** / [Madsen, Christina](#).  
Aalborg Universitetsforlag, 2017. 247 p.  
Research output: Ph.D. thesis  
Published
50. **"Revolución" en la educación de ingeniería: ¿Cómo puede contribuir PBL?** / [Guerra, Aida](#) (Editor); [Rodríguez Mesa, Fernando](#) (Editor).  
Aprendizaje basado en problemas en ingeniería: Teoría y práctica. ed. / [Fernando Rodríguez-Mesa](#); [Anette Kolmos](#); [Aida Guerra](#). Aalborg : Aalborg Universitetsforlag, 2017. p. 1-11.  
Research output: Book chapter  
Published
51. **Student challenges when learning to become a real team in a PBL curriculum : Experiences from first year science, engineering and mathematics students.** / [Spliid, Claus Christian Monrad](#); [Bøgelund, Pia](#); [Dahl, Bettina](#).  
6th International Research Symposium on PBL: PBL, Social Progress and Sustainability. ed. / [Aida Guerra](#); [Fernando José Rodríguez](#); [Anette Kolmos](#); [Ismael Pena Reyes](#). Aalborg Universitetsforlag, 2017. p. 351-363.  
Research output: Article in proceeding  
Published

52. **Sustainability accreditation in Engineering Education : Comparison between Danish and French contexts.** / Guerra, Aida; Holgaard, Jette Egelund; Jolly, A.M.  
 Proceedings of the 45th SEFI Annual Conference: Education Excellence for Sustainability. ed. / José Carlos Quadrado; Jorge Bernardino; Joao Rocha. SEFI: European Association for Engineering Education, 2017. p. 137-144.  
 Research output: Article in proceeding  
 Published
53. **Teacher in a problem-based learning environment : Jack of all trades?** / Dahms, Mona Lisa; Spliid, Claus Christian Monrad; Nielsen, Jens Frederik D.  
 In: [European Journal of Engineering Education](#), Vol. 42, No. 6, 2017, p. 1196-1219 .  
 Research output: Journal article  
 Published
54. **Ten years in engineering education research : looking back ahead.** / de Graaff, Erik.  
 In: [European Journal of Engineering Education](#), Vol. 42, No. 6, 02.11.2017, p. 587-590.  
 Research output: Editorial  
 Published
55. **(D)effecting the Child : The scientification of the self through school mathematics.** / Andrade-Molina, Melissa.  
 Aalborg Universitetsforlag, 2017. 252 p.  
 Research output: Ph.D. thesis  
 Published
56. **The construction of teaching roles at Aalborg university centre, 1970–1980.** / F. C. Servant-Miklos, Virginie ; Spliid, Claus Christian Monrad.  
 In: [History of Education](#), Vol. 46, No. 6, 2017, p. 1-22.  
 Research output: Journal article  
 Published
57. **The Impact of Problem-based Learning on Students' Competencies in Technical Vocational Education and Training.** / Mohamad, Hashim Bin.  
 Aalborg Universitetsforlag, 2017. 358 p.  
 Research output: Ph.D. thesis  
 Published
58. **The philosophical and pedagogical underpinnings of Active Learning in Engineering Education.** / Christie, Michael; de Graaff, Erik.  
 In: [European Journal of Engineering Education](#), Vol. 42, No. 1, 02.01.2017, p. 5-16.  
 Research output: Journal article  
 Published
59. **The study approaches of university students in a calculus class.** / Dahl, Bettina.  
 Mathematics Education as a Science and a Profession. ed. / Zdenka Kolar Begović; Ružica Kolar Šuper; Ljerka Jukić Matić. Osijek, Croatia : Element, 2017. p. 7-17.  
 Research output: Article in proceeding  
 Published

60. **Towards Integrating Realities : Pragmatic Constructivism and Arendt's Theory of Action.** /

[Henriksen, Lars Bo.](#)

In: [Proceedings of Pragmatic Constructivism](#), Vol. 7, No. 1-21, 21.12.2017, p. 4 - 9.

Research output: Journal article  
Published

61. **Transition from high schools to engineering education.** / [Kolmos, Anette](#); [Holgaard, Jette Egelund](#); [Clausen, Nicolaj Riise](#); [Bylov, Stine Møller](#).

Proceedings of the 45th SEFI Annual Conference 2017: Education Excellence for Sustainability. Vol. 45 European Society for Engineering Education SEFI, 2017. p. 998.

Research output: Article in proceeding  
Published

62. **Trends in Engineering Education Research : A systematic database analysis.** /

[Rodriguez-Mesa, Fernando](#); [Guerra, Aida](#); [de Graaff, Erik](#); [Peña-Reyes, Ismael](#).

7th Research in Engineering Education Symposium. Vol. 2 Curran Associates, Inc, 2017. p. 835-844.

Research output: Article in proceeding  
Published

63. **AAU teknisk-naturvidenskabelige studerendes forventning og parathed til det kommende arbejdsliv : Arbejdsrapport nr. 2.** /

[Kolmos, Anette](#); [Koretke, Rene Bonde](#).

UNESCO, 2017. 44 p.

Research output: Report





This annual report will only report on selected activities.

On our web site [www.ucpbl.net](http://www.ucpbl.net) you will find a pdf version of the annual report, containing a more comprehensive portfolio of activities and appendixes including:

- Appendix A List of staff and board members
- Appendix B List of research projects
- Appendix C Participation in Conferences, International Workshops, Seminars and Research Meetings
- Appendix D Participation in Invited Keynotes, Lectures and Round Tables
- Appendix E Workshops and visits arranged by the Aalborg Centre
- Appendix F Publications

**THIS ANNUAL REPORT PRESENTS HIGHLIGHTS FROM UCPBL 2017  
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**AALBORG UNIVERSITY**

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