

TEAMWORK
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ANNUAL REPORT 2015

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



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

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1. PREFACE

The Aalborg Centre for Problem Based Learning in Engineering, Science and Sustainability, under the auspices of UNESCO, (hereafter Aalborg Centre) has the overall objective to develop a *global society of practitioners, researchers, experts and institutions within the field of Problem Based and Project Based Learning (PBL) in STEM (Science, Technology, Engineering and Mathematics) and Sustainability* from developing and developed economies, to establish research, educational activities and outreach to schools and surrounding society.

During 2015, a comprehensive list of activities has been undertaken, as this annual report will show. For example, the International Research Symposium on Problem Based Learning (IRSPBL) is held at different locations all over the world. In 2015 the 5th IRSPBL took place in San Sebastian, Spain, with a total of 221 participants from 26 countries. The planning for the coming IRSPBL symposium has started and it will be held at Universidad Nacional de Colombia, Bogota, in July 2017. The relation between PBL, education for sustainable development and social responsibility will be addressed in the Bogota IRSPBL. To develop establishment of the global network, the Aalborg Centre has received grant from Danish Agency for Science, Technology and Innovation, Ministry of Higher Education and Science, to initiate closer collaboration with institutions in China and Brazil especially on PBL and innovation. The project will be carried out in the coming year.

As part of the global strategy, the Aalborg Centre is running training workshops for visitors twice a year and has received very positive feedback. These workshops are run in Aalborg and involved 40 visitors from most parts of the world. The Aalborg Centre also runs workshops on PBL internationally and this year the workshops have been held as part of on-going projects in Africa, Asia, Europe and South America. Due to funding from the DANIDA project Building Stronger Universities, the Aalborg Centre has been involved in an impressive training effort at African universities. As a future strategy, we intend to change the training strategy towards more online training modules that will be available for free. In 2015, we have already started series of webinars on PBL cases and in 2016 webinars will be on cases on sustainability in STEM education. All webinars are available online.

In the field of research, there has also been a high level of activity. More than 60 research publications have been produced, and three PhD students have been awarded degrees. PhD training is one of the core strategies for the Aalborg Centre, but the number of PhD students enrolled in the program has dropped

drastically from an average of 5-6 in past years to only one this year. Normally, the PhD students come in with their own funding, and national scholarship programs as in Brazil, Columbia, Chile, China, Malaysia and Thailand.

A group of mathematics education researchers have joined the Aalborg Centre, led by professor Paola Valero, and the number of academic staff in permanent positions has increased. That has involved a change in the research profile including more subject didactic areas and beside EER (engineering education research) we also include STEM research as part of Aalborg Centre focus. This change is also very much aligned with increased outreach activities on STEM at the school and high school levels with special focus on technology subjects. The local unit of the ASTRA centre (Centre for Science, Technique and Health) has moved to the Aalborg Centre as well. In the future, our strategy is to establish more projects on sustainable innovation and entrepreneurship throughout the educational systems and in a close collaboration with corporations and other stakeholders.

Several new research projects have been established, partly on STEM students' success and career perspectives, partly on sustainability and outreach to schools. More than 10 external applications have been submitted and two of the minor applications have been successful. During the year, we have also participated in several internal activities at AAU, namely the development of the PBL strategy and establishment of educational activities on sustainability. The internal work at AAU is important and will serve as the living examples of PBL and sustainability activities.

The activity level for the Aalborg Centre has been high, and we would like to thank all our members on advisory boards and consultative committees as well as our international partners for their commitment, support and advice. Without this interaction and support, we would never have achieved the goals.

Finally, we would like to thank our sponsors for their commitment and trust. The Faculty of Engineering and Science, together with the OBEL Family Foundation are the main sponsors.

2. STAFF

ACADEMIC STAFF



Anette Kolmos
Director, Professor



Erik de Graaff
Professor



Lars Bo Henriksen
Professor



Tony Marjoram
Guest Professor



Roger Hadgraft
Professor, RMIT,
Adjunct Professor



Jette Egelund Holgaard
Associate Professor



Mona Dahms
Associate Professor



Bettina Dahl Søndergaard
Associate Professor



Pia Bøgelund
Part-time Assistant Professor



Aida Guerra
Assistant Professor



Claus Spliid
Teaching Assistant Professor



Steen Hyldgaard Christensen
Adjunct Associated Professor



Stine Bylov
Research Assistant



Hanan Lassen Zakaria
Visiting Lecturer



Paola Valero
Professor



Ruth Graham
Guest (Associate Professor)

ADMINISTRATIVE STAFF



Marianne Nyborg



Morten Andersen



Anni Møller Brændstrup

3. ORGANISATION

Advisory Board

The Advisory Board consists of the following members:

Eskild Holm Nielsen, Dean, Faculty of Engineering and Science, Aalborg University

Brian Figaji, former VC Peninsula Technikon, VP Engineering Council SAfrica, member UNESCO Executive Board

Zhong Binglin, Professor, Beijing Normal University, and President of the Chinese Society of Education

Rovani Sigamoney, Science Policy and Capacity Building, Natural Sciences, UNESCO

Anette Kolmos, Director, UNESCO Aalborg Centre, Aalborg University

Henrik Brohus, Head of School, Aalborg University

Jes Vollertsen, Head of PhD School, Aalborg University

Erik de Graaff, Professor, UNESCO Aalborg Centre, Aalborg University

Lars Bodum, Head of Department, Department of Development and Planning, Aalborg University

Tony Marjoram, Guest Professor, Department of Development and Planning, Aalborg University

A second Advisory Board meeting was held on October 25, 2015. A presentation was held reviewing the organisation of the Aalborg Centre, in which major areas of work in networking, research, education and outreach in PBL, with reference to research symposia, global networking, research and PhD students, PBL education and the Master Program in PBL, outreach and STEM were discussed.

Reference was made to the need to include open source materials and case studies. Examples of networking and cooperation were presented from Kuwait, Qatar, India, Malaysia, Japan, Thailand, Singapore, China, Africa (Ghana, Kenya, Tanzania, South Africa), North and South America, Brazil, Chile and Colombia the Nordic region and EU, including a discussion of the centre work plan.

The intention with the next International Research Symposium on PBL is to move it to Bogota in 2017, and inquiries have been conducted for a more comprehensive palette of activities.

Consultative Committee

The Aalborg Centre is 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.

4. GLOBAL NETWORK

The development of a global network on PBL is one of the core activities of the Aalborg Centre. The objectives of the global network are to bring researchers, teachers, practitioners, companies and policymakers together to share knowledge and experiences on how to utilize PBL in the development of engineering and science education. To fulfil these objectives, the global network task force organised and hosted several activities, namely:

THE 5TH INTERNATIONAL RESEARCH SYMPOSIUM ON PROBLEM-BASED LEARNING (IRSPBL) 2015

The Aalborg Centre collaborates with international partners in organising the bi-annual International Research Symposium on Problem-Based Learning (IRSPBL). In 2015 the 5th IRSPBL took place in Donostia, San Sebastian (Spain), from 6–10 July 2015. This was a joint conference together with Active Learning in Engineering (ALE) and Project Approaches in Engineering Education (PAEE) hosted by Mondragon University. The conference was highly successful with a total of 221 participants from 26 countries around the world.



Following previous events in Europe, Australia and Asia, IRSPBL will go to South America. The 6th IRSPBL is planned to take place in Bogota, Colombia, from July 3-5, 2017. This time the IRSPBL will be jointly organised with the Research in Engineering Education Symposium (REES). The hosts of the event will be the Universidad Nacional de Colombia and Universidad de los Andes. In relation to the symposium 2017, a series of Spanish books, both on PBL theory and PBL cases from South American Universities, are planned.



PBL AND INNOVATION INTERNATIONAL NETWORK

To support the global network, the Danish Agency for Science, Technology and Innovation, Ministry of Higher Education and Science will fund the establishment of closer collaboration with universities in Brazil and China. In 2016, visits will be carried out with the objectives to start research and research training on PBL and innovation in Engineering Education. All over the world, there are reports on a lack of employable engineers and the need for new competences. In China and Brazil, new competences like sustainable innovation and entrepreneurship are requested to address the needs of society. Although there have been incidental contacts, at this moment we have no formal collaboration with these two countries.

In general, we will continue our research collaboration with partners around the world, including projects with Ghana, Moldova, China and Brazil. We also welcome international PhD students, and will work to achieve this.

VISITORS' WORKSHOPS

The Aalborg PBL model inspires educators around the world and many of them come to visit Aalborg. Twice a year a workshop is organised to accommodate the needs of these visitors. Each time there are around 15–20 people participating and engaged in discussion on PBL, change and creating contacts and networks. Several visitors have expressed their satisfaction with these workshops, some have asked for an extended program with more detailed information. All participants of the workshops are added to the list of contacts maintained for the Global PBL Network.



A special Visitors Workshop was organised on November 27, 2015, together with Diana Stentoft of the Faculty of Medicine on request for a group of managers in Medicine and Health Sciences from the Amsterdam region. Representatives from other institutions visited Aalborg Centre during 2015.

WEBINARS

The first webinars series, under the theme "PBL History and Diversity", were delivered in June 2015 where ten cases of PBL implementation and management of change from Asia, Europe and North America were hosted by Aalborg Centre. This initiative aimed to strengthen and to develop the Aalborg Centre global network for PBL and had more than twenty registered participants from all over the world. The webinars were recorded and are available as open source material, which can be seen at: <http://www.ucpbl.net/global-network/webinars/>.

OPEN SOURCES

Beside the webinars, the Aalborg Centre also produced other open sources including videos, conference proceedings and research reports. For example, Bettina Dahl Søndergaard was invited to make a series of videos presentations where she focuses on the Aalborg PBL model.

The IRSPBL proceedings are available at Aalborg Centre website as well as the research report on "Institutional Capacities in E-learning and Problem Based Learning at Universities and University Colleges in Tanzania and Ghana". These publications can be seen in publications list and are available at Aalborg Centre webpage (<http://www.ucpbl.net/global-network/>).



5. RESEARCH AND PHD TRAINING

During 2015, Aalborg Centre initiatives included several new research projects:

PROCEED-2-WORK

PROCEED-2-WORK focus on the Danish engineering students' expectations of a coming labour and follow them into the labour market to cover their experiences in the transition from education to work. This project is a follow up on a completed project, funded by the Strategic Research: PROCEED (Programme of Research on Opportunities and Challenges in Engineering Education in Denmark). One of the PROCEED projects had focus on the transformation from high school to university and on the expectations for the engineering profession. Surveys have been sent out to all Danish engineering students enrolled in 2010, 2011 and 2015. PROCEED-2-WORK follows this group of students enrolled 2010 further into the labour market, to analyse their understanding of the engineering profession and expectations of working life. The focus of the study will be: 1) identification of the expectations of working life and their perceived readiness in both technical professional and generic competences, 2) expectations for the future profession, 3) identification of elements in the education and elsewhere which have contributed to the working life readiness 4) engineering skills development in innovation, entrepreneurship and opportunities for change. The project is financed by UNESCO Aalborg Centre and the Faculty of Engineering and Science at Aalborg University, and the COWI foundation. More external funding will be applied for.

RETENTION AND DROP OUT AMONGST 1ST YEAR BACHELOR STUDENTS AT THE FACULTY OF ENGINEERING AND SCIENCE

The purpose of the Dropout project is to gather knowledge about the dynamics of retention and dropout amongst 1st year bachelor students at the Faculty of Engineering and Science. It is also a purpose to seek out possibilities for offering support to those students that are in risk of dropping out. Medialogy is a case since this education has a very high dropout rate. The research questions are: What is the relationship between students' motivation, expectation and 1st year experiences and their tendency to drop out or stay? Data are collected by means of surveys, interviews, individual journals. Expected outcome is to identify key variables for dropout in PBL curricula. The project is funded by the Faculty of Engineering and Science.

BSU E-LEARNING AND PBL PROJECT 2014 – 2016

While problem based learning and e-learning have gained increasing foothold at many universities around the world, the same change has yet to be seen in Africa. In the Building Stronger Universities (BSU) project on E-learning and Problem Based Learning (PBL), funded by Danida, staff from three Danish universities have been collaborating with staff from three universities and one university college in Tanzania and two universities in Ghana to strengthen the institutional capacities in PBL and e-learning in the South institutions.

Activities undertaken in the project include: Mapping of PBL and e-learning in each of the South institutions; regional active hands-on training-of-trainers workshops and on-line consultancy with the aim of integrating elements of PBL and e-learning into existing courses; institutionalized training of teachers by the local trainers, applying active hands-on training methods; networking within and between countries; formulation of strategies for continuation of PBL and e-learning activities after project completion; documentation in form of conferences, two in Ghana and one in Tanzania.

The project comes to an end by March 31st, 2016 by which time the funding from Danida ends. External funding will be sought for continued collaboration, with more focus on interdisciplinary PBL and entrepreneurship education.

Beside the new research projects granted in 2015, the Aalborg Centre also participates in EU projects, namely:

PROJECT WORK-BASED LEARNING IN INDUSTRIAL ENGINEERING (2013-2016)

The project is designed to foster closer cooperation between the worlds of vocational education and training (VET) providers and industry, and will focus on adapting previous projects titled "Continuing Engineering Education as Work Based Learning" - (CEE as WBL), and Industrial Engineering Standards in Europe (IESE) into an education model that will bring the learning process directly into the workplace. This project is funded by Transfer of Innovation.

MOLDOVA – PBLMD

Members of the UCPBL participate in the project 'Introducing Problem Based Learning in Moldova: Toward Enhancing Students' Competitiveness and Employability (PBLMD). In 2016 university staff in Moldova will be trained in PBL skills by a team from Aalborg. The project is funded by ERASMUS+.

COMPASSES PROJECT

Assessment of student competences with emphasis on the development of competences. Collaborative European project between Tknika and Mondragon University, Spain; Libera University of Bolzano and Tangram, Italy; Sociedade Portuguesa de Inovacao, Portugal; Northern University College, Ireland; and UC Syd and Aalborg University, Denmark. Funded by EU, Lifelong Learning Program.

MATHEMATICS AND SCIENCE EDUCATION AND THE DISPOSITIVE OF TECHNOSCIENTIFICITY

International collaborative project between Gelsa Knijnik, Universidade do Vale do Rio dos Sinos, São Leopoldo, Brazil; Gloria García, Universidad Pedagógica Nacional, Bogotá, Colombia; Malin Ideland, Malmö University, Malmö, Sweden; Aalborg University, Aalborg, Denmark. Under examination for financing in the Brazilian Research Council (CnPq). Since September 2014.

During 2015, the Aalborg Centre was also granted with projects funded by Nordic institutions, namely:

Enhancing Student Learning Experience in Interdisciplinary Area Studies (NPHE-2015/10223). Continuation of network from 2004. Funded: EUR 11,096 by Nordplus which is the Nordic Council of Ministers' central programme in the area of lifelong learning.

Partner in the Nordforsk Centre of Excellence Justice through Education (NCoE JustEd). Center funded by NordForsk. Since June 2013.

Reduction of inequalities for high-school boys, with University College Metropol. Developmental research. Funded by the Region Midt Denmark. Since August 2014.

Learning in reality - Practice-oriented education networks to enhance primary school pupils' interest in climate and science. The aim of the project is to develop, establish and explore new forms of local cooperation between schools, businesses, Aalborg University and municipalities on energy and climate to interest and engage young people in science and climate. Funded by the Danish Energy Foundation.

PHD TRAINING

Apart from PhD training, three PhD students were successfully awarded their degrees, a new PhD student was enrolled and three transferred their PhD studies to Aalborg Centre. Also Aalborg Centre run PhD courses including two new courses.

The following three PhD students defended and were awarded with PhD degree:



Bente Nørgaard
PhD



Prarthana Coffin
PhD



Shota Furuya
PhD

Bente Nørgaard with thesis "Disclosing New worlds in Continuing Education".

Prarthana Coffin with thesis "The Impact of Implementing Problem-Based Learning in a Thai University".

Shota Furuya with thesis "Sustainability Praxis in Community Based Renewable Energy Planning and Development".



Concetta Ianniello
PhD Student



Aldo Parra-Sánchez
PhD Student



Alex Montecino Munoz
PhD Student



Melissa Andrade-Molina
PhD Student

Concetta Ianniello, from Italy, started her PhD studies at Aalborg Centre. And the students Aldo Parra-Sánchez, Colombia, Alex Montecino Munoz, Chile, Melissa Andrade-Molina, Chile, have transferred their PhD studies to the Aalborg Centre.

Aalborg Centre also welcomed the guest PhD student Fabian Andres Gonzalez from Universidad del Valle, Columbia for the period of three months.

The following six PhD students are enrolled and in process of writing their Ph.D. thesis.



Christina Madsen
PhD Student



Hashim Bin Mohamad
PhD Student



Annette Grunwald
PhD Student



Ron Ulseth
PhD Student



Bart Johnson
PhD Student



Kjell Staffas
PhD Student

Apart from a long list of PhD courses we have especially developed 2 new courses:

PBL WORKSHOP FOR PH.D. STUDENTS

November 24-25 & December 8
Institution and Country: AAU, Aalborg, Denmark
Run by: Erik de Graaff & Lars Peter Jensen

ENGINEERING EDUCATION – HISTORY, REFORMS AND FUTURE CHALLENGES (AN ONLINE COURSE)

December 2, 2014 – March 17, 2015
Institution and Country: AAU, Aalborg, Denmark
Run by: Steen Hyltdgaard Christiansen

6. ENGINEERING AND SCIENCE EDUCATION FOR SUSTAINABILITY

In 2015 the Task Force for Engineering and Science Education for Sustainability has been engaged in the following activities to be followed up in 2016.

COMPLETING CASE-EXPERIMENTS

Case-experiments has been completed at the Faculty of Engineering and Science, Aalborg University, where workshops were designed to integrate sustainability in the programmes of Geography, Nano-technology, Electronics, Internet & Computer Technology and Robotics. Common for the workshops were that facilitators got the students to conceptualise sustainability, link sustainability to their field of study and made them approach real life problems within their field in relation to sustainability. This was done by a high degree of active learning and ad-hoc appropriated mini-lectures, student presentations along with feedback. In 2016 these activities will be followed up by documenting the case experiments.



DEVELOPING THE RELATIONSHIP TO THE ENGINEERING SOCIETY

The Task Force has developed the relationship to the Engineering Society for Engineering Education (SEFI) by a keynote and a workshop at the Annual Conference in June. Furthermore, UCPBL holds the Chair of the SEFI workgroup on Sustainability in Engineering Education. In 2016 these activities will be followed up by engaging the SEFI workgroup participants in a webinar series considering different approaches to Engineering Education for Sustainable Development. Based on these webinar series a publication on the different approaches is planned for 2017.



DESIGN OF AN ONLINE LEARNING PLATFORM

Another activity has been to design an online learning platform based on PBL principles as a part of project funded by the Poul Due Jensens Fond and the Aalborg Centre. The design initiated a field trip to Shanzu in order to enrich the platform with a sense of the context through films and interviews. This educational platform will be open-source and is targeted to a worldwide community of engineering educators and students. The design has been presented at the International Joint Conference on the Learner in Engineering Education (IJCLEE 2015) and has been published in the proceedings. In 2016 the design will be implemented in the on-line platform.



7. PBL AND STAFF DEVELOPMENT INTERNALLY AND EXTERNALLY

During 2015, PBL and Staff Development activities target international staff from outside Aalborg University (i.e. external activities for non AAU staff) and staff from Aalborg University (i.e. internal activities for AAU staff).

The Master in Problem Based Learning (MPBL) has enrolled 12 participants in single subject modules and for the entire master in 2015.

In the pipeline is the proposal for summer school (Advanced workshops) and more open source material on PBL which can work as elements in PBL training internally as well as externally.

Internally, the Aalborg Centre is part of the AAU PBL Academy. Several staff members have represented the Faculty of Engineering and Science in working groups organized by the PBL Academy, e.g. Flexible Learning Environment, ensuring Progression in Student Competencies with PBL, and intercultural competencies in a PBL environment. Furthermore, the Aalborg Centre contributed to the process of formulating the strategy for AAU, particularly the issues about PBL.



**23-26
NOVEMBER**

**WORKSHOP ON PROBLEM
BASED LEARNING AT
THE UNIVERSIDAD NACIONAL
DE COLOMBIA**

Bogota, Colombia
Anette Kolmos and
Nestor Arana Arexolaleiba

5-8
JANUARY

**INTERNATIONAL CONFERENCE
ON TRANSFORMATION IN
ENGINEERING EDUCATION**

Bangalore, India
Anette Kolmos



21-25
JULY



**TANZANIA COMMISSION FOR UNIVERSITIES
- ANNUAL EXHIBITION AND WORKSHOP
ON "IMPROVING HIGHER EDUCATION IN
TANZANIA THROUGH E-LEARNING AND
PROBLEM BASED LEARNING"**

Dar es Salaam, Tanzania
Mona-Lisa Dahms

8. OUTREACH

The Aalborg Centre has been engaged in several outreach activities - and this area has been strengthened by the integration of the mathematics education groups and the closer collaboration with the ASTRA centre. During the year, applications have been submitted to the EU and several workshops and events have been held.

Especially, projects with Danish technical high schools (HTX) have been conducted. For example "The Manu - Skills" project for HTX students is a project aiming at studying the use of enhanced ICT-based technologies and training methodologies to facilitate an increase of young talents' interest in manufacturing and to support their training of new manufacturing skills. This is carried out in collaboration with Department of Production, Aalborg University and funded by the EU.



The Aalborg Centre held a workshop on the concepts Engineering and Technology in the technical high school (HTX), especially focusing on technology subjects and technical science. The workshop was organized jointly by Aalborg University and Danish Ministry for Children, Education and Gender Equality, Office of Upper Secondary Education.

The work on HTX continues and teachers from eastern and western Denmark met for a course on didactics in practice (Fagdidaktik i praksis), especially focusing on the subject technology.



9. KEYNOTES AND PARTICIPATION IN CONFERENCES

In 2015 eleven keynotes were given. The full list is available at:
<http://www.ucpbl.net/about/brochures-annual-reports/>

Staff from the Centre have participated in 18 conferences all over the world in 2015.
The full list is available at: <http://www.ucpbl.net/about/brochures-annual-reports/>

10. VISITS TO THE AALBORG CENTRE

This year 14 international groups visited the Aalborg Centre, including the visitor's workshop in March and October.

The full list is available at:
http://www.ucpbl.net/digitalAssets/154/154183_visits-2015.pdf

11. PUBLICATIONS

1. Andersen, H. L.; Dahl, B. and Tofteskov, J. (2015). Assessment and Exams. In: L. Rienecker; P. S. Jørgensen; J. Dolin; G. H. Ingerslev (eds), *University teaching and learning*. Samfundslitteratur. p. 369-408.
2. Andersson, A. and Valero, P. (2015). Negotiating Critical Pedagogical Discourses: Contexts, Mathematics, and Agency. In: P. Ernest; B. Sriraman. Charlotte (red), *Critical mathematics education: Theory and praxis*. IAP.
3. Andersson, A; Valero, P. and Meaney, T. (2015). "I am [not always] a maths-hater": Shifting students' identity narratives in context. *Educational Studies in Mathematics*, Vol. 90, Nr. 2, pp. 143-161.
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5. Andrade-Molina, M.; Montecino, A. ; Parra, A. and Valero, P. (2015). Insubordinated Psychopathologies. In: B. D'Ambrosio; C. Lopes (eds), *Creative Insubordination in Brazilian Mathematics Education Research*. NC, pp. 261-272.
6. Andrade-Molina, M. and Valero, P. (2015). The sightless eyes of reason: Scientific objectivism and school geometry. *CERME 9 Congress of European Research in Mathematics Education: Proceedings of the 9th Congress of the European Society for Research in Mathematics Education*.
7. Andrade-Molina, M. and Valero, P. (2015). Shaping a Scientific Self: A circulating truth within Social Discourse. *Proceedings of the Eighth International Mathematics Education and Society Conference*. Swapna Mukhopadhyay; Brian Greer. Vol. 2 Oregon, pp. 284-297.
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13. Christensen, S. H. (2015). Engineering as a Liberal Art – Vehicle for Critical Thinking or Material Rewards?. *Engineering Studies (Journal)*, Taylor & Francis, DOI: 10-1080/19378629.2015.1062490
14. Christensen, S. H. (2015). Humanistic Engineering, *Issues in Science and Technology, Forum*. The National Academies. University of Texas at Dallas
15. Christensen, S. H.; Didier, C.; Jamison, A. ; Meganck, M.; Mitcham, C. and Newberry, B. (2015). *International Perspectives on Engineering Education: Engineering Education and Practice in Context*. Volume I. Springer Science + Business Media B.V.
16. Christensen, S. H.; Didier, C.; Jamison, A.; Meganck, M.; Mitcham, C. and Newberry, B. (2015). *Engineering Identities, Epistemologies and Values: Engineering Education and Practice in Context*. Volume II. Springer Science + Business Media B.V.
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12. APPENDICES

1. INVITED KEYNOTES, LECTURES AND ROUND TABLES

JANUARY 5-8

Invited keynote at International Conference on Transformation in Engineering Education

Link: <http://www.ictiee.org/ictiee2015/index.php>

Country: Bangalore, India

Anette Kolmos

JANUARY 16 – 18

Invited joint paper with Gelsa Knijnik (Unisinos, Brazil) at International Conference "The Disorder of Mathematics Education", with title "Mathematics and science education and the dispositive of technoscientificity"

Institution and country: Freie Universität, Berlin.

Paola Valero

MARCH 18

Invited Keynote at 4th International PBL Symposium, Republic Polytechnic

Link: http://www.rp.edu.sg/CED/PBL_Symposium_2015/Homepage.aspx

Country: Singapore

Anette Kolmos

APRIL 29

Joint seminar with Kenneth M. Jørgensen (Aalborg University) at the Education and Social Research Institute Lecture Series, with title "Storytelling, Subjectivity and Education"

Institution and Country: Manchester University, Manchester, UK
Paola Valero

JULY 1

Invited keynote at the SEFI Annual Conference, with title "Embedding sustainability in engineering identities"

Link: <http://sefi2015.sciencesconf.org/resource/page/id/25>

Country: Orleans, France

Jette Egelund Holgaard

JULY 8

Joint keynote with Michael Christie at the 13th International Workshop Active Learning in Engineering, with title "An essay on the Active Learner in Engineering Education"

Link: <http://ijclee2015.mondragon.edu/en>

Country: San Sebastian, Spain

Erik de Graaff

AUGUST 17-21

Invited presentation at the plenary panel "Educational systems and cultures in the Nordic countries. At the summer school 2015 of the NordForsk Center of Excellence JustEd.

A Nordic model?", with title "The Danish educational system. Transformation of the Nordic ideal"

Institution and country: Oslo

Paola Valero

SEPTEMBER 21 – 25

Invited to Alumni Networking Workshop: Addressing resilience and sustainability in Energy Management- 25 years of development oriented studies at the University of Flensburg, with presentation "Problem Based Learning – a tool for education for sustainability"

Institution and country: University of Flensburg, Germany

Mona-Lisa Dahms

SEPTEMBER 23

Invited lecture at the seminar "Humanities now", with title: "Muerte o transfiguración: Sobre las humanidades en el capitalismo tecnológico"

Institution and Country: Organized by the deanship of Humanities, Universidade do Vale do Rio dos Sinos (Unisinos).

Sao Lopoldo, Brazil

Paola Valero

SEPTEMBER 24-25

Invited keynote at University-Business Forum "Developing Talents for Innovation-Based Economies"

Link: <http://www.ubforum-lithuania.eu/>

Country: Lithuania

Anette Kolmos

SEPTEMBER 29

Presentation about PBL, Aalborg UNESCO Centre on PBL in Engineering Science and Sustainability to academic staff from Latvia, Estonia, the Netherlands, visiting the Department of Development and Planning

Organizers: Carl Smink and Martin Lehmann, Department of Development and Planning, Aalborg University

Country: Aalborg, Denmark

Aida Guerra

OCTOBER 1

Invited panellist for 3rd Pan European Days of Environmental Education towards Sustainability

Link: <http://catalonia.environmental-education.org/>

Country: Barcelona, Spain

Aida Guerra

NOVEMBER 6

Invited keynote at the World Science Forum

Link: <http://www.sciforum.hu/>

Country: Budapest, Hungary

Anette Kolmos

NOVEMBER 10-11

Member of the organising team from the Danish Engineering Educational Pedagogical Network (IUPN)

Link: <http://www.iupn.dk/>

Country: Denmark

Mona-Lisa Dahms

NOVEMBER 16

Participation on research seminar at the Doctoral program in mathematics and science education at Department of Mathematics Education of Stockholm University, with title "Examining the rationality of mathematics and science education"

Institution and Country: Stockholm University, Stockholm

Paola Valero

NOVEMBER 18

Presentation at the Kick-off meeting of the Project Introducing PBL, with title "Shifting the educational paradigm: From Teaching to Learning"

Institution and country: Moldova, Chisinau

Erik de Graaff

NOVEMBER 18-19

Invited lecture at International Symposium on Critical Curriculum Theory, with title "Critical didactics. The case of critical mathematics education"

Institution and Country: Department of pedagogy, didactics and educational research. Uppsala

Paola Valero

NOVEMBER 19

Invited keynote at International Forum on Engineering Education

Country: Beijing, China

Tony Majoram

NOVEMBER 19-21

Invited key note speaker on Problem Based Learning to the 15th Annual National Conference on Education

Institution and Country: Oboda University, Hungary

Mona-Lisa Dahms

NOVEMBER 23 – 28

Invited to the North West University to discuss research collaboration with the members of the research group for Self-Directed Learning (SDL)

Country: Potchefstroom, South Africa

Mona-Lisa Dahms

NOVEMBER 30 – DECEMBER 3

Invited key note speaker on Problem Based Learning to the First West African Regional Conference on Problem Based Learning and e-learning, Hosted by Kwame Nkrumah University of Science and Technology (KNUST), including one day for consultations with the two Ghanaian partners in the BSU project: KNUST and University of Ghana (UG)

Mona-Lisa Dahms

2. DECEMBER AND 8. DECEMBER

Invited keynote at Fagdidaktik i praksis (Didactics in practice) – Subject: Technology, with title "What to do with the subject Technology? The technical high school as preparation for engineering education"

Institution and Country: Danish Ministry for Children, Education and Gender Equality, Denmark

Lars Bo Henriksen

DECEMBER 4-6

Invited keynote at Sixth Greek Congress of Mathematics Education Research (GARME 6), with title "In(ex)clusion in mathematics education and the fabrication of the modern citizen"

Institution and Country: Greek Association of Mathematics Education and Aristotle University, Greece

Paola Valero

2. WORKSHOPS RUN BY AALBORG CENTRE STAFF

During 2015, Aalborg Centre academic staff organized and run several workshops on PBL, Engineering Education and Sustainability. Some these workshops were both run at Aalborg while others were invited workshops and run outside Aalborg and in collaboration with other organizations, namely in internal conferences.

JANUARY 8-12

Workshop on PBL at International Conference on Transformation in Engineering Education

Link: <http://ictiee.org/>

Country: Bangalore, India

Run by: Vikas Shinde, Khairiyah Yusof, Anette Kolmos

JANUARY

Workshop on PBL

Institution and Country: Vishwaniketan Institution, Mumbai, India

Run by: Vikas Shinde, Khairiyah Yusof, and Anette Kolmos, for 100 dedicated academic staff

MARCH 12 – 13

Visitors' Workshop – Spring 2015

Institution and Country: AAU, Aalborg, Denmark

Run by: Anette Kolmos; Erik de Graaff; Claus Spliid; Bettina Dahl; Lars Bo Henriksen; Mona-Lisa Dahms

MARCH 13

Workshop on How to Write Research Proposals

Institution and Country: UTM & MARA, Malaysia

Run by: Anette Kolmos, Khairiyah Yusof and Mohd Fadzil Daud

MARCH 16

Workshop on CDIO, PBL and Critical Factors in Initiating and Implementing Successful Curriculum Change

Institution and Country: UTM, Malaysia

Run by: Anette Kolmos, with assistance of Mahyuddin Bin Arsaf

MARCH 16 -18

Workshops in connection with the Training of Trainers work package of project BSU E-learning and PBL Project

Institutions and countries: Sokoine University of Agriculture, Morogoro, Tanzania and University of Ghana, Accra and Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

Run by: Mona-Lisa Dahms

MARCH 17

Workshop at the 4th International PBL Symposium, Republic Polytechnic

Institution and Country: Republic Polytechnic, Singapore

Run by: Anette Kolmos

JUNE 29

Workshop on Sustainability and Engineering Education

Institution and Country: SEFI Annual Conference, Orleans, France.

Link: <http://sefi2015.sciencesconf.org/resource/page/id/25>

Run by: Jette Egelund Holgaard and Aida Guerra

JULY 9

Workshop on Management of Change

Institution and country: 5th International Research Symposium on PBL (IRSPBL), in collaboration with International Joint Conference on the Learner in Engineering Education (IJCLEE 2015), Mondragon, Spain.

Link: <http://ijclee2015.mondragon.edu/en>

Run by: Anette Kolmos and Ron Ulseth

JULY 9

Workshop on PBL vision for 2015

Institution and country: 5th International Research Symposium on PBL (IRSPBL), in collaboration with International Joint Conference on the Learner in Engineering Education (IJCLEE 2015), Mondragon, Spain

Link: <http://ijclee2015.mondragon.edu/en>

Run by: Aida Guerra, Anette Kolmos and Erik de Graaff

Facilitated by: Pia Bøgelund, Claus Spliid, Mona-Lisa Dahms, Lars Bo Henriksen, Bente Nørgaard, Ron Ulseth, Bart Johnson

JULY 10

Workshop "Research Methodologies"

Institution and country: Joint Conference on the Learner in Engineering Education (IJCLEE 2015), Mondragon, Spain

Link: <http://ijclee2015.mondragon.edu/en>

Run by: Aida Guerra, Erik de Graaff, Nestor Arana-Arexolaleiba, Natascha van Hattum-Janssen

JULY 21-25

Invited workshop presenter to the Workshop on Improving Higher Education in Tanzania Through E-Learning and Problem Based Learning

Institution and country: Organised by the Tanzania Commission for Universities (TCU) in collaboration with the BSU project on e-learning and PBL. The workshop was organised in connection with the 10th TCU Exhibition on Higher Education, Science and Technology.

Link: <http://www.tcu.go.tz/index.php/2015-exhibitions>

Invited presenter: Mona-Lisa Dahms

OCTOBER 8 AND 9

Visitors' Workshop – Fall 2015

Institution and Country: AAU, Aalborg, Denmark

Run by: Anette Kolmos; Erik de Graaff; Claus Spliid; Bettina Dahl; Lars Bo Henriksen; Mona-Lisa Dahms

NOVEMBER 10 AND 11

Hands-on session on the use of the Study Activity Model in engineering education

Institution and Country: Exploring Teaching for Active Learning in Engineering Education (ETALEE) conference in Skylab, Technical University of Denmark.

Link: <http://www.iupn.dk/>

Run by: Mona-Lisa Dahms and supported by Claus Spliid.

NOVEMBER 23-26

Workshop on Problem Based Learning at The Universidad Nacional de Colombia

Institution and country: Universidad Nacional de Colombia

Run by: Anette Kolmos and Nestor Arana Arexolaleiba

NOVEMBER 27

Tailored Visitors Workshop for Health Sciences Managers from Amsterdam

Run by: Erik de Graaff and Diana Stentoft

DECEMBER 3

Workshop on the Concepts Engineering and Technology in the Technical High School – Subjects: Technology and technical science

Institution and Country: Aalborg University and Danish Ministry for Children, Education and Gender Equality Office of Upper Secondary Education

Run by: Lars Bo Henriksen

DECEMBER 4

Workshop on Facilitation

Visitors from KTH Stockholm, Sweden

Run by: Bente Nørgaard and Claus Spliid

DECEMBER 14-18

Teacher Training Programme

Institution and country: at Kilimanjaro Christian Medical University College and at University of Dar es Salaam – University College of Education.

Participation of: Mona-Lisa Dahms

3. PARTICIPATION IN INTERNATIONAL WORKSHOPS, CONFERENCES AND RESEARCH MEETINGS

During 2015, Aalborg Centre participated in several international conferences with paper contributions.

JANUARY 9

Participation at the World Bank Meeting "Strategies for the Engineering Education in India Towards 2025"
Country: Bangalore, India
Video Link: <https://www.youtube.com/watch?feature=youtu.be&v=PIDNkdAhnVw&app=desktop>
Participant: Anette Kolmos

FEBRUARY 4-8

9th Congress of European Research Mathematics Education
Link: <http://www.cerme9.org/>
Institution and Country: Charles University in Prague, Czech Republic
Participants: Melissa Andrade-Molina, Alex Montecino

JANUARY 15-17

Participation at the workshop "The disorder of mathematics education"
Institution and Country: Freie Universität of Berlin, Germany
Link to event: http://www.ewi-psy.fu-berlin.de/einrichtungen/arbeitsbereiche/grundschulpaed/3_mathematik/forschung/tagung/teilnehmer/index.html
Participants: Melissa Andrade-Molina, Alex Montecino

MARCH 18-20

4th International PBL Symposium
Link: http://www.rp.edu.sg/CED/PBL_Symposium_2015/Homepage.aspx
Institution and Country: Republic Polytechnic Singapore
Participants: Hashim Mohamad, Anette Kolmos

APRIL 23

Facilitator at the Conference about Innovation and Entrepreneurship of the panel debate "Innovativ evaluering og entreprenørskab [Innovative Assessment and Entrepreneurship]"
Institutions and country: Fonden for entreprenørskab, Aalborg University, and University College of Northern Denmark.
Bettina Dahl Søndergaard

MAY 3-7

XIV Conferencia Interamericana de Educación Matemática
Link: http://xiv.ciaem-redumate.org/index.php/xiv_ciaem/index/pages/view/fechas
Institution and Country: Universidad del Valle de México, Mexico.
Participants: Melissa Andrade-Molina, Alex Montecino

MAY 6

Center Leader Meeting in connection with DUN-conference (Dansk Universitetspædagogisk Netværk), under the theme "Hvordan opkvalificerer vi os selv som undervisningsudviklere – erfaringer og ønsker?" [Further qualification for educational developers]
Participant: Bettina Dahl Søndergaard

MAY 14 - 15

IACEE 2015 workshop on Online Learning of CEE
Link: http://www.iacee.org/newsfeed_2015_may.php
Institution and country: Beijing Institute of Technology on 14-15 may 2015
Participant: Bente Nørgaard

JUNE 21 - 26

8th Mathematics Education and Society
Link: <https://sites.google.com/a/pdx.edu/mes8/cfp>
Institution and Country: Portland University, United States of America.
Participant: Melissa Andrade-Molina, Alex Montecino

JUNE 25 - JULY 2

Participation at Baltic University Programme – Teachers' Sustainability Applied in International Learning (SAIL) on board S/S Fryderyk Chopin, from Stavanger, Norway to Belfast, Northern Ireland
Participant: Mona-Lisa Dahms

JULY 29 - JULY 2

Annual SEFI Conference: European Association for Engineering Education
Link: <http://sefi2015.sciencesconf.org/>
Institution and Country: New Orleans, France
Participants: Erik de Graaff, Pia Bøgelund, Aida Guerra, Bente Nørgaard, Jette Egelund Holgaard, Anette Kolmos

JULY 6 - 10

International Joint Conference on the Learner in Engineering Education (IJCLEE 2015), in collaboration with Active Learning in Engineering (ALE), Project Approaches in Engineering Education (PAEE) and International Research Symposium on PBL (IRSPBL)

Link: <http://ijclee2015.mondragon.edu/en>

Institution and Country: Mondragon, Spain

Participants: Claus Spliid, Erik de Graaff, Pia Bøgelund, Aida Guerra, Bente Nørgaard, Anette Kolmos, Lars Bo Henriksen, Mona-Lisa Dahms, Bettina Dahls, Ronald Ulseth, Bart Johnson, Kjell Staffas

JULY 13 - 15

REES conference: Translating Research into Practice

Link: www.rees2015.org/

Institution and Country: Dublin, Ireland.

Participants: Erik de Graaff, Anette Kolmos

AUGUST 4 - 18

Participation at Baltic University Programme – Students' Sustainability Applied in International Learning (SAIL) on board S/S Fryderyk Chopin, from Aalborg, Denmark to Świnoujście, Poland

Participant: Mona-Lisa Dahms.

Also a total of 32 students from 16 different countries and many different areas of academia, together with 6 teachers, including Professor Dennis Meadows, US

AUGUST 24 -25

"Aalborg University's experience in project and problem-based teaching" at Workshop: "Approaches to Teaching in Interdisciplinary Studies"

Event/ conference: Part of NordPlus financed project

"Enhancing Student Learning Experience in Interdisciplinary Area Studies." With Nordplus "Baltic Sea Region Studies Network"

Country: Tartu, Estonia

Participant: Bettina Dahl Søndergaard

SEPTEMBER 20 - 24

International Conference on Interactive Collaborative Learning (ICL)

Link: <http://icl-conference.org/icl2015/>

Institution and Country: Florence, Italy

Participant: Erik de Graaff

Invited for a meeting for high school principals in Northern Jutland about mathematics with title "Tiltag på og uden for gymnasieskolen rettet mod matematiktalenterne. Overgangen til universitetet [Mathematics talented students and the transition to university] Det Gymnasiale Kontaktråd"

NOVEMBER 19

Event Organised by Lise Holmgaard, High School Secretariat, Aalborg University, DK

Symposium: International Symposium on Critical Curriculum Theory

Participant: Bettina Dahl Søndergaard

4. OPEN ACCESS RESOURCE

During 2015, Aalborg Centre produced several new open access materials videos.

VIDEOS:

1. Søndergaard, Bettina Dahl (Performer); Mikkelsen, Beni Maroc (Photographer) (2015). *Grupperarbejde: Hvordan håndterer man problemer med et gruppe-medlem?*
Youtube Link: https://www.youtube.com/watch?v=HH1sdj_WMn4
2. Johansen, Per Michael (Performer); Søndergaard, Bettina Dahl (Performer); Mikkelsen, Beni Maroc (Photographer) (2015). *Hvad kendetegner en god projektgruppe?*
Youtube link: <https://www.youtube.com/watch?v=UsTvn9rX0Gw>
3. Søndergaard, Bettina Dahl (Performer); Mikkelsen, Beni Maroc (Photographer)(2015). *PBL-eksperten: Om forventningsafstemning i projektarbejdet.*
Youtube Link: <https://www.youtube.com/watch?v=fHPJLDZLYjw>
4. Søndergaard, Bettina Dahl (Performer); Mikkelsen, Beni Maroc (Photographer) (2015). *PBL-eksperten: "Disse problemer er de mest typiske i projektarbejdet".*
Youtube Link: <https://www.youtube.com/watch?v=OysrjXGEuRo>
5. Søndergaard, Bettina Dahl (Performer); Mikkelsen, Beni Maroc (Photographer) (2015). *PBL-eksperten : "Dette skal I huske på under gruppedannelsen".*
Youtube Link: <https://www.youtube.com/watch?v=EzR5pMnQuyg>

WEBINARS: PBL HISTORY AND DIVERSITY: (LINKS AVAILABLE AT: [HTTP://WWW.UCPBL.NET/ GLOBAL-NETWORK/WEBINARS/](http://www.ucpbl.net/global-network/webinars/))

1. *Introduction to PBL and Change Strategies*
By Prof Anette Kolmos, Aalborg University, Denmark
Date: 25th September, 2014
2. *History of PBL*
By Ms. Virginie Servant, Erasmus University, Netherlands & Promethea Education
Date: 24th October, 2014

3. *PBL models and professional practices: Aalborg and Maastricht Universities as examples*
By Prof Erik de Graaff, Aalborg University, Denmark
Date: 18th November, 2014
4. *PBL in Medical Education: The McMaster experience*
By Dr David Kwan, Shantou University & McMaster University, China & Canada
Date: 17th December, 2014
5. *PBL @ Republic Polytechnic: Creating Authentic and Active Learning Experiences*
By Dr Yasser Mattar, Republic Polytechnic Singapore, Singapore
Date: 12th January, 2015
6. *Supporting students learning for PBL*
By Prof Khairiyah Yusof, UTM, Malaysia
Date: 17th February, 2015
7. *10YPBL - Ten years of PBL in one degree of industrial engineering and management at the University of Minho*
By Dr Rui Lima, Universidade do Minho, Portugal
Date: 18th March, 2015
8. *From Learning to responsible Learning with PBL*
By Dr Lamjed Bettaieb, École Supérieure Privée d'Ingénierie et de Technologies (ESPRIT), Tunisia
Date: 16th April (re-schedule for 27th May), 2015
9. *Mondragon University experience using PBL and competency-based curriculum in engineering education*
By Dr Nestor Arana Arexolaleiba, Mondragon Unibertsitatea, Spain
Date: 20th May, 2015
10. *Iron Range Engineering Project Based Learning Model*
By Ronald Ulseth and Bart Johnson, Iron Range Engineering Programme and Itasca Community College
Date: 24th June, 2015

5. VISITS TO THE AALBORG CENTRE

Every year, the UCPBL is the host of visitors. After the start of visitors' workshop which is held twice a year the number of visits have been reduced. This year UCPBL has been responsible for organizing 13 visits at the Aalborg Centre.

DATES	INSTITUTION
20-21 January	CAE-Tsinghua Centre for Engineering Education, China
12-13 March	SRH Hochschule Heidelberg, Germany University of Vic, Spain University of Twente, Netherlands University College Dublin, Ireland Chalmers University of Technology, Sweden Australian College of Kuwait, Kuwait
18 March	Ngee Ann Polytechnic School of Life Sciences & Chemical Technology, Singapore
24 March	National Instruments, Luxembourg
25 June	School of Engineering, Universidad Adolfo Ibanez, Chile
30 July	North Carolina A&T State University and Greensboro, N.C., USA
24 August	ETSEQ, Spain
6-20 September	Universidad de la Laguna, Spain
21 September- December 4	Universidad del Valle, Colombia
22 September	Beijing Normal University, China
8-9 October	ORT Braude College, Israel University of Twente, Netherlands Silesian University of Technology, Poland VAMK University of Applied Sciences, Finland Australian College of Kuwait, Kuwait Stony Brook University, US
4 December	KTH Stockholm, Sweden
10 December	Lappeenranta University, Finland



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AALBORG UNIVERSITY

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• in Engineering Science and Sustainability
• under the auspices of UNESCO
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