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**More women -> more innovation
-> more "development"?**

**RUFORUM Regional workshop:
Developing Africa through Science,
Technology and Innovations in Agriculture:
"Women as the key drivers"**

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Danish Development Research Network

- Multi-stakeholder network North-South
- Mainly in agriculture, environment and governance
- Production, dissemination and exchange of research-based knowledge

Membership is free

Further information: www.ddrn.dk



UNESCO Chair Problem Based Learning

- Global network of institutions and individuals interested in Problem Based Learning (PBL)
- Network of researchers in PBL
- Master in PBL - www.mpbl.aau.dk
Further information: www.ucpbl.net



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Two Take-home Messages

1. Innovation is enhanced by diversity, incl. gender diversity
2. Higher Education in S&T needs to change - for many reasons, one of them being: to attract more women



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Outline

- The problem ?
- Innovation
- CuWaT - (part of) a solution ?
- PBL: An example CuWaT curriculum



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The Problem ?

- Few women in science and technology (S&T) world wide - is this a problem?
- Yes, for (at least) two reasons:
 - Society loses women's contribution to S&T
 - Innovation is inhibited



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Innovation and Diversity

- Recent Danish study documents that the capacity for innovation in SME is increased by increased diversity of staff in terms of:
 - Gender
 - Ethnicity
 - Education



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Innovation and Gender

For example:

- Increasing the proportion of female staff from 25 to 40% increases the innovation capacity by 110%
- Too little political focus on diversity as a resource



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More Women in S&T - win-win-win

- More women -> win for the women
- More innovation -> win for society
- More women -> more students -> win for institutions



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... but... **HOW** to attract Women?

The **Curriculum for Women and Technology (CuWaT)** project developed good guidelines for gender-inclusive S&T curriculum in Higher Education



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CuWaT Skills Development

- Discipline specific knowledge
- Methodological skills
 - Problem solving; Information processing; Project management
- Social skills
 - Communication; Team working; Interdisciplinarity
- Learning skills
 - Self-management; Innovation; Creativity



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CuWaT Proposal

Fundamental changes in three related areas:

- Study form
- Study contents
- Institutional culture



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CuWaT Study Form

- Student-centred, collaborative learning
- Active and experiential learning, incl. reflection
- Responsibility for own learning
- Life-long learning



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CuWaT Study Contents

- Themes as framework for learning
- S&T in context
- Interdisciplinarity
- Theory - practice relation



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CuWaT Institutional Culture

- Recognise and value diversity
- Respect and acknowledge all individuals
- Open-mindedness
- Social and environmental responsibility



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PBL: Example CuWaT Curriculum

- What is PBL?
- Why introduce PBL?
- PBL in Brazil
- PBL at Faculty of Engineering, Science and Medicine, Aalborg University: A project example from Electronic Engineering, 1st Year



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What is PBL?

"PBL reflects the way people learn in real life; they simply get on with solving the problems life puts before them with whatever resources are to hand." (Biggs 2003, p. 232; emphasis added)



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PBL Learning Principles

- ✓ Learning is based on real-life problems, therefore it is
- ✓ contextualised and interdisciplinary
- ✓ Action oriented with theory - practice relation
- ✓ Participant directed and experience based
- ✓ Team organised, dialogic and democratic
- ✓ Project organised and exemplary
- ✓ Critically questioning



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Why PBL - a student perspective

Working with real life problems

- meets students' interests
- enhances motivation, study efforts and learning outcomes

PBL develops students' professional skills, incl.

- problem solving, project management
- ability for critical thinking
- social, ecological and ethical responsibility
- communication, negotiation and conflict resolution
- life long learning



- a student perspective

AAU students:

- *"This way of learning is much better than only attending lectures, because I have to know why I need to learn this. When I know the objective clearly, I learn much better."*
- *"I think that it becomes easier when you learn technical matters in groups."*
- *"When working on a problem, I am strongly motivated and attracted. We need to solve this problem."*



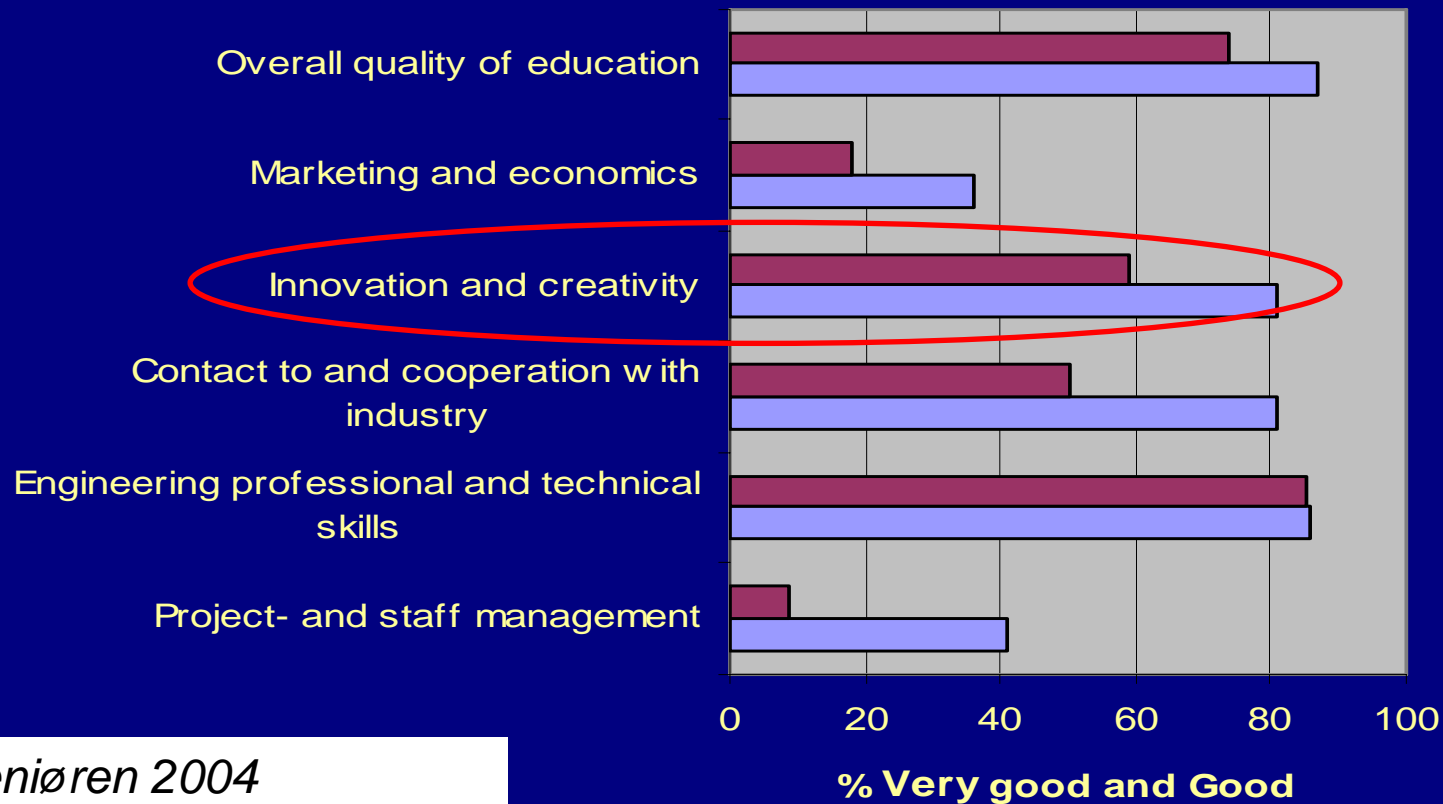
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- an industry perspective

Competences



Ingeniøren 2004



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University of Brasilia

First PBL university in the world (?)

Main aims:

- ✓ Counteract scientific dependency on the West
- ✓ Help solve development problems in Brazilian society



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University of Brasilia

Main characteristics:

- Problem solving
- Interdisciplinarity
- Experimentation
- Integration of research and teaching
- Critical, incl. self-critical approach to teaching and research
- Collaboration with society



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AAU: A self-adjusting head rest

Project proposal:

"Whiplash injuries often occur when a car is hit by another car from the back. The risk of injuries is dependent upon many factors, such as the speed and the design of the head rest. Furthermore, in many cases the head rests are not adjusted properly which may add to the degree of injury.

Is it possible to make a head rest which adjusts itself correctly in relation to the position of the head of the person in the car seat? Such a system would include a measurement of the position of the head."



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A self-adjusting head rest

Technical disciplines
integrated:

- distance transducers
- **circuit theory**
- **electronics**
- electrical drives
- process control
- (simple) statistics

Social science
disciplines integrated:

- **use of interviews and questionnaires**
- Physiology (the neck)
- marketing
- traffic law
- **technology assessment**



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A self adjusting head rest

Outcome:

- A professional project report
- A reflective process analysis
- A prototype measurement set up indicating vertical and horizontal position of the head
- The solution was implemented in a car seat with only vertical adjustment.



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Thank you for your attention ...

Time for questions and discussion

Any further questions to:
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