

Real work life focused learning – a competitive curriculum for a small university college?

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Beijing



吴弘 Hong Wu



Dr. eng. at NTNU

ENG

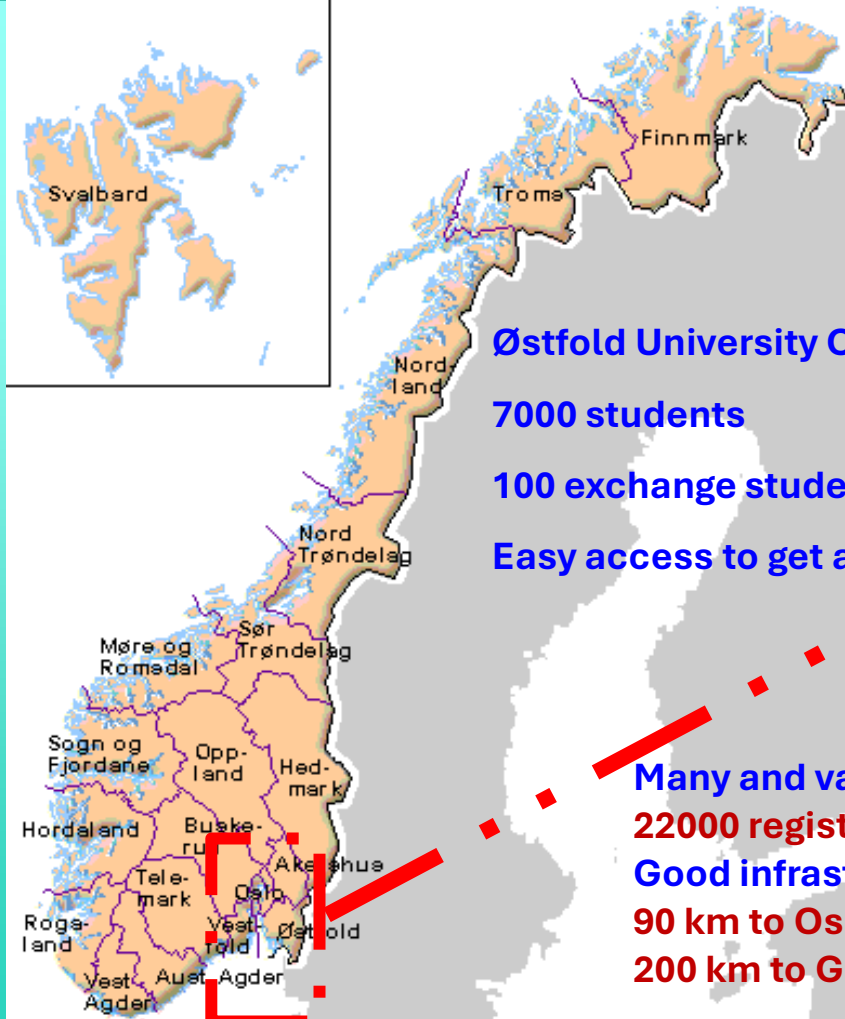
Business

- Technology and project management
- Product development and service design
- Company internship
- Project management
- Sustainable change management





IS
EEA, ISK, NATO









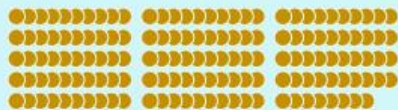






NORWAY

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WINTER OLYMPICS

ALL-TIME GOLD MEDALS



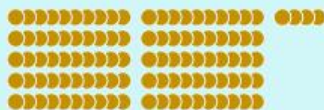
U.S.

114



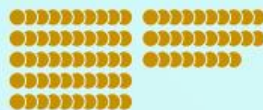
GERMANY

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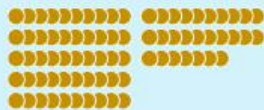
USSR

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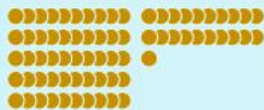
CANADA

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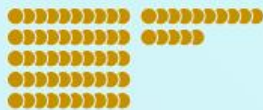
AUSTRIA

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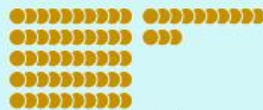
SWEDEN

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SWITZERLAND

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Source: <https://www.visualcapitalist.com/visualizing-winter-olympics-all-time-gold-medals/>



Successful reform in 2015

33 down to 21 public universities

The merger was processed after parliament resolution presented in 2015. The purpose of the structural reform is to pool resources at fewer, but stronger universities and colleges.

This is absolutely crucial for Norway to manage the transition required in the coming years, says the ministry of higher education

Kilden: <https://www.regjeringen.no/no/aktuelt/fra-33-til-21-statlige-universiteter-og-hoyskoler/id2515995/>

ALLEREDE SAMMENSLÅTT

Universitetet i Tromsø
– Norges arktiske universitet (UIT)
Universitetet i Tromsø
– Norges arktiske universitet (UIT)
Høgskolen i Harstad (HfH)
Høgskolen i Narvik (HfN)

Nord universitet

Universitetet i Nordland (UfN)
Høgskolen i Nesna (HfNe)
Høgskolen i Nord-Trøndelag (HfNT)

Norges teknisk-naturvitenskapelige universitet (NTNU)
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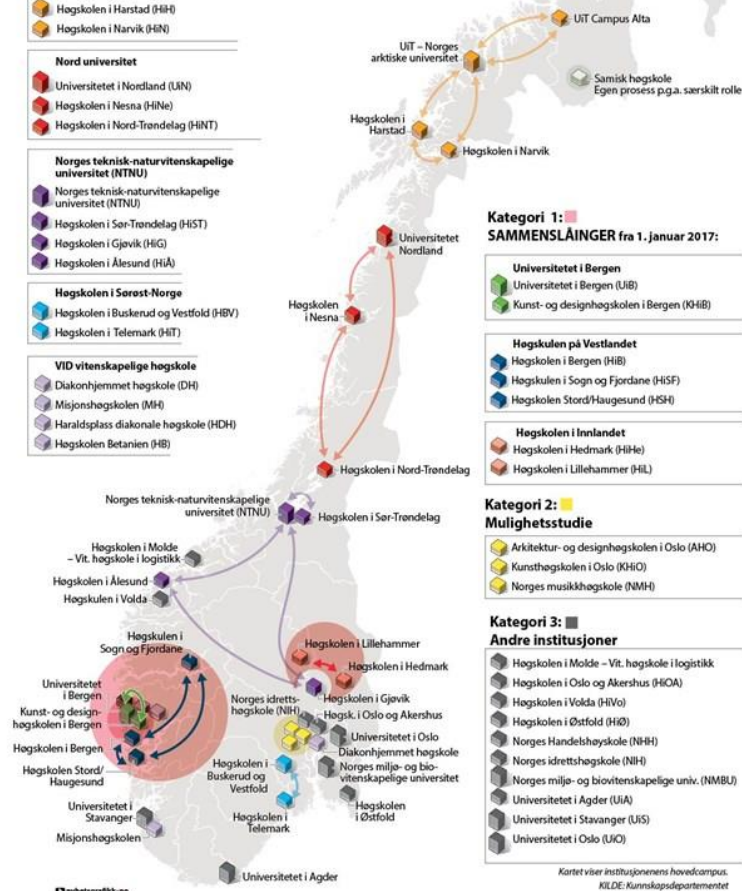
Høgskolen i Sør-Trøndelag (HfST)
Høgskolen i Gjøvik (HfG)
Høgskolen i Ålesund (HfÅ)

Høgskolen i Sørøst-Norge

Høgskolen i Buskerud og Vestfold (HfBV)
Høgskolen i Telemark (HfT)

VID vitenskapelige høyskole

Diakonhjemmet høyskole (DH)
Misjonshøgskolen (MH)
Haraldsplass diakonale høyskole (HDH)
Høgskolen Betanien (HB)



Higher Education

Topic

As a knowledge nation, Norway has a great need for people with high level professional skills across a broad spectrum of fields. It is a goal that everyone should be able to get an education regardless of their social background. Welfare schemes for students are an instrument that can be used to achieve this. The government wants to change the structure of higher education to achieve solid specialist research communities and high quality education.

Ministry of Education and Research

Quality in higher education is on the vital agenda



Quality in higher education
↓
Universities and university colleges are to



Structure of higher education
↓



Students
→
The Ministry of Education and Research

- Rewarding for course unit credit production, not only number students
- Rewarding the graduation, completion study programs.
- Real work life relevant teaching

- **General development at Østfold University College www.hiof.no**
- **Restructured organization – faculties merging and cross - sections**
- **Highly credited research demanded**
- **Collaboration with real work life needed**
- **Sustainable approaches required, less contracted teaching hours**
- **New challenges for us as a small university college**



What is education quality?

Quality contains knowledge, skills and expertise that delivered, and the way communicated and learned.

Quality criteria include learning objectives, curriculum content, program design, teaching/work methods, supervising and assessment forms.

Learners/students' efforts, backgrounds and learning strategies contribute how the learning outcomes can be.

Quality assess input factors, process factors and result factors.

Skills and expertise
work methods
Assessment forms

Learning by doing, self-organized study, motivations, challenges and benefits.

Presentation of project and groupwork based learning methods

learning strategies and learning outcomes

“How can I get my students to think?” is a question asked by many faculty, regardless of their disciplines. Problem-based learning (PBL) is an instructional method that challenges students to "learn to learn," working cooperatively in groups to seek solutions to real world problems. *Barbara Duch*

University of Delaware (<http://www.udel.edu/pbl/>)



Prof Johan Malmqvist receives the Leonardo da Vinci Medal from SEFI

The Leonardo da Vinci Medal is the highest distinction SEFI can bestow. The Medal is awarded once a year to a living person who has made an outstanding contribution of international significance to engineering education.

[Read more](#)

Welcome to CDIO!

The CDIO™ INITIATIVE is an innovative educational framework for producing the next generation of engineers. The framework provides students with an education stressing engineering fundamentals set in the context of Conceiving – Designing – Implementing – Operating (CDIO) real-world systems and products. Throughout the world, CDIO Initiative collaborators have adopted CDIO as the framework of their curricular planning and outcome-based assessment. CDIO collaborators recognize that an engineering education is acquired over a long period and in a variety of institutions, and that educators in all parts of this spectrum can learn from practice elsewhere. *The CDIO network therefore welcomes members in a diverse range of institutions ranging from research-led internationally acclaimed universities to local colleges dedicated to providing students with their initial grounding in*

Want to know more?

[Contact us](#)

[How to join](#)

Join our LinkedIn & Facebook groups for discussions, updates & more

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The framework provides students with an education stressing engineering fundamentals set in the context of Conceiving — Designing — Implementing — Operating (CDIO) real-world systems and products.

- Integrated different units as one holistic system
- Project based learning focused



Learning subject
Bachelor project
work



Conceiving
Circulation economy
Designing
Reused parts car
Implementing
Company sponsor
Knowledge
Recycle business





Operating
Conducting the project and build the car themselves

Learning by doing

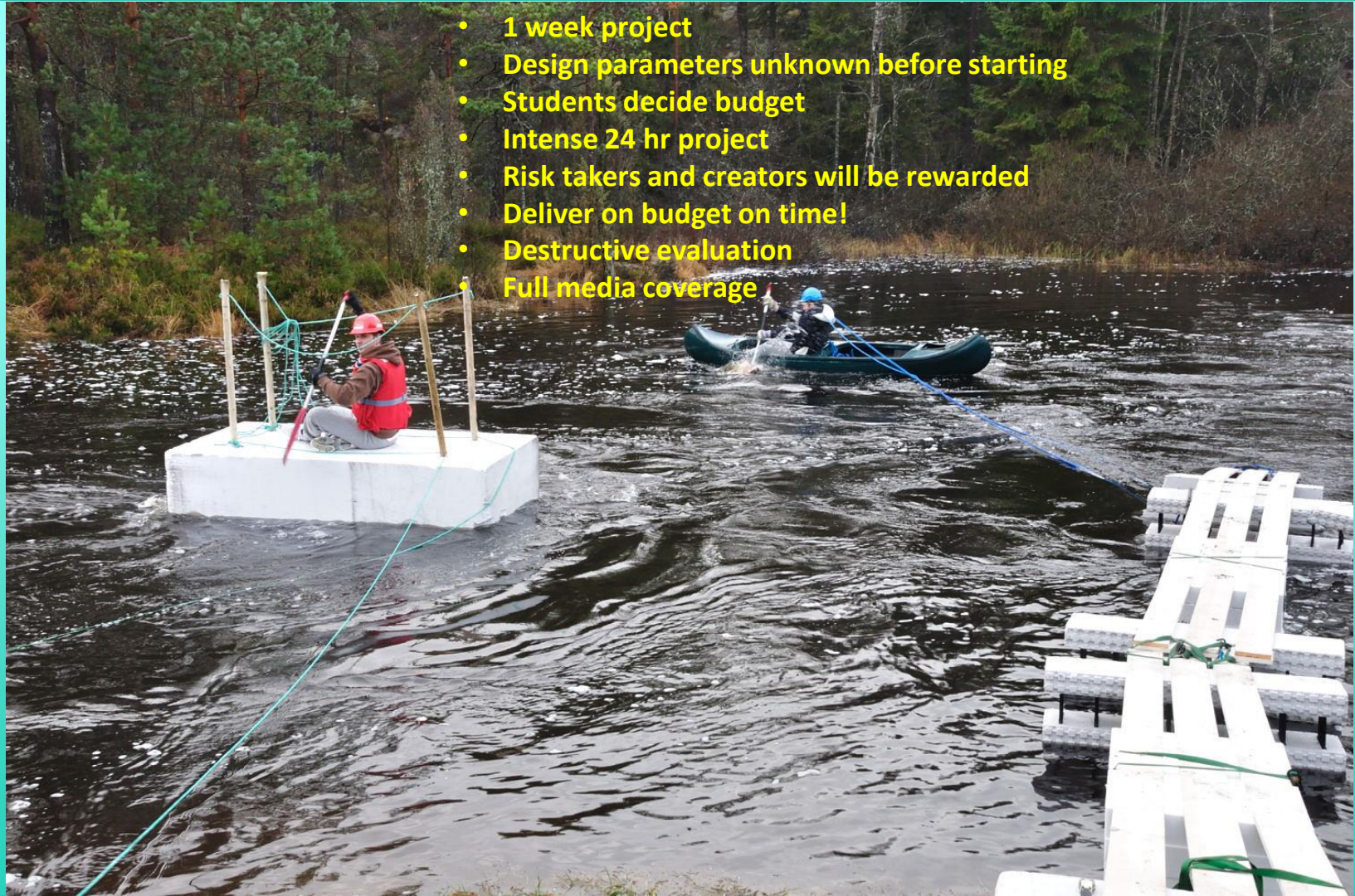
Integrated as a part of regular study

A group of approximately 15 people, mostly young adults, are gathered in a forest clearing. They are wearing safety gear: blue and red hard hats, and high-visibility vests in yellow, orange, and blue. They are working on a small bridge structure made of white rectangular blocks. Some people are standing on the bridge, while others are on the ground. There are two green canoes and one red canoe nearby. A wooden ladder is leaning against the bridge structure. The background shows a dense forest of tall evergreen trees and a rocky hillside.

Learning subject Teamwork

Learning by doing
Simple small bridge building
Learn to handle time pressure:
Calculation, budget, time management, quality control, teamwork, media presentation, destruction testing, evaluation, reflection notes.

- 1 week project
- Design parameters unknown before starting
- Students decide budget
- Intense 24 hr project
- Risk takers and creators will be rewarded
- Deliver on budget on time!
- Destructive evaluation
- Full media coverage



Evaluation criteria

- Strength
- Cost
- Time management
- Design
- Creativity
- Team skills



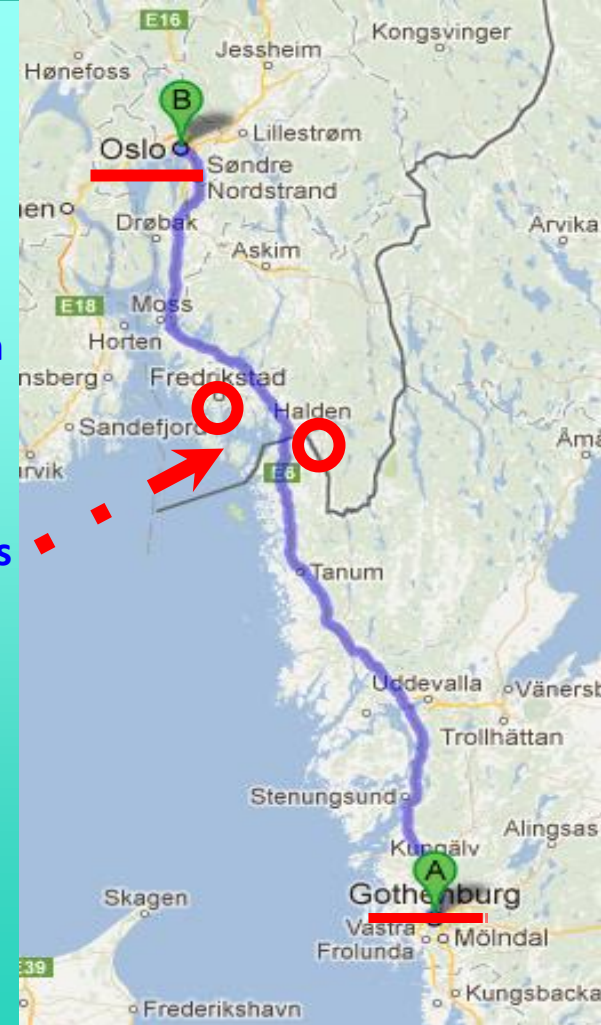
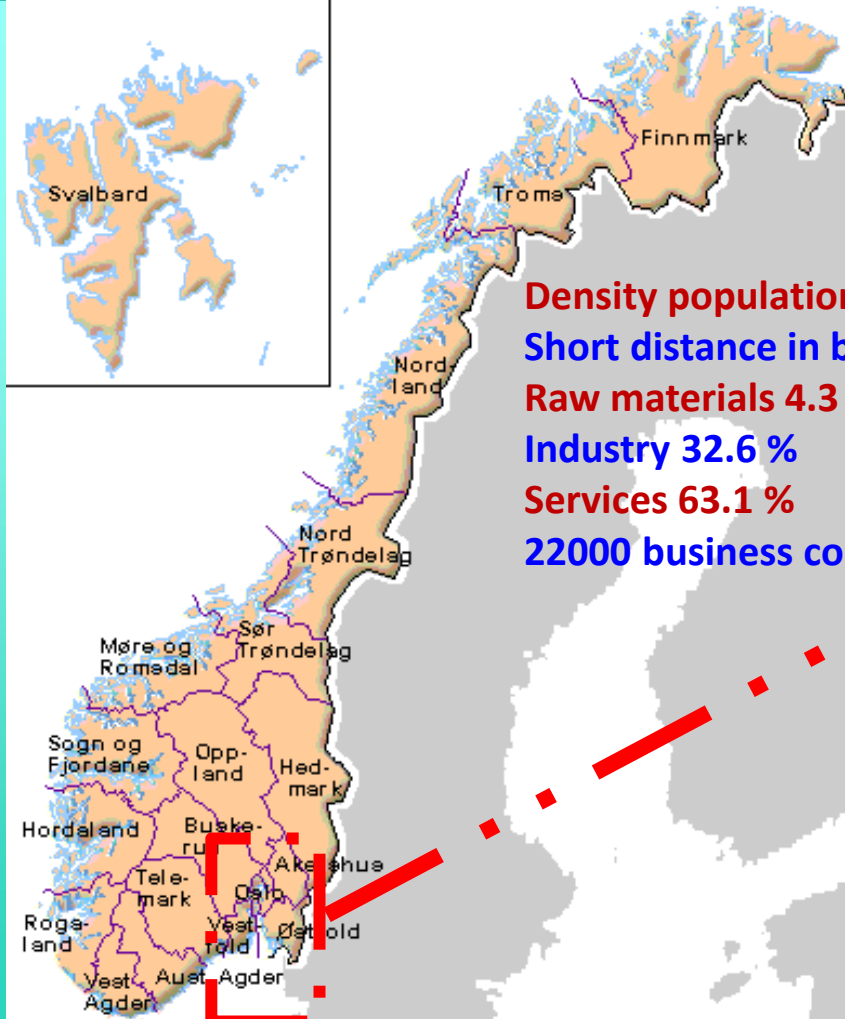


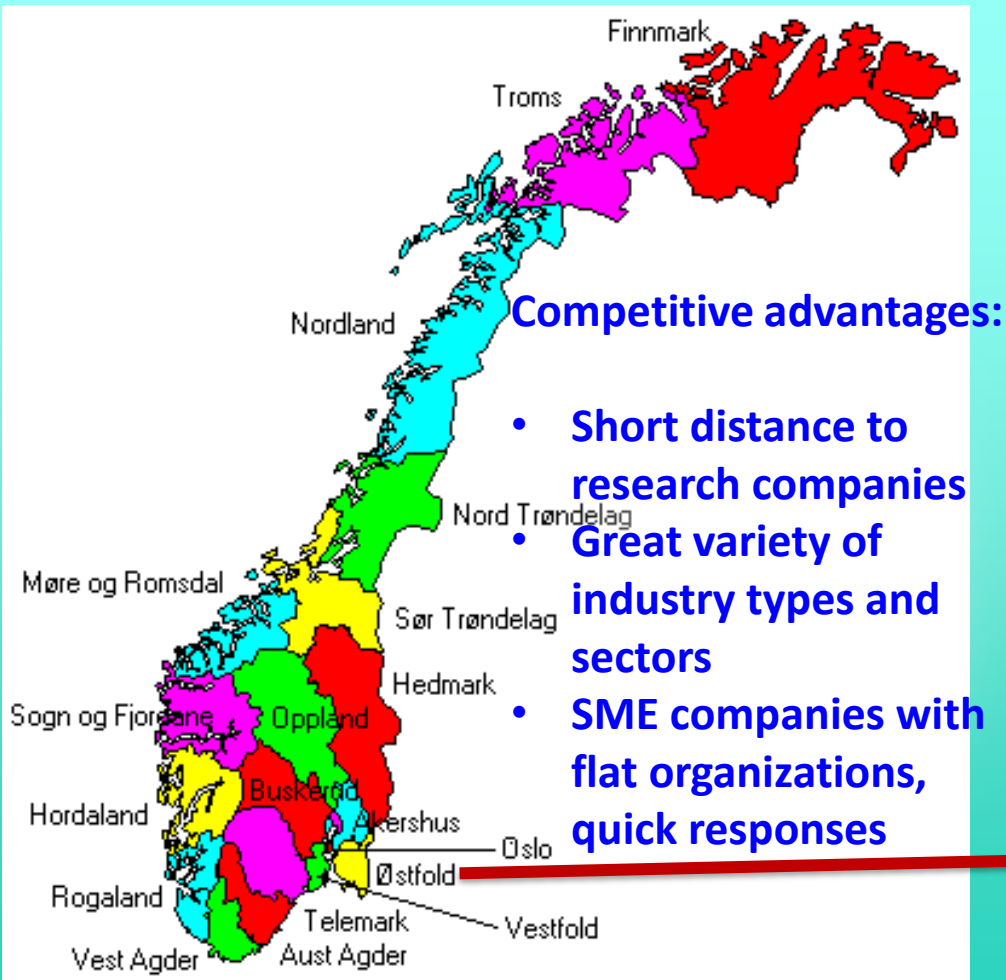
IRI16020 Produktutvikling/Product Development Lecture Plan

Learning subject Product design and development

Chapter in textbook/lecture notes	Date	
General and practical course information	20.08	
Identifying Customer Needs (4) Product Specifications (5)	27.08	
Identifying Customer Needs (4) Product Specifications (5)	03.09	HW
Concept Generation (6) Concept Selection (7)	10.09	HW
Concept Testing (8) Design for Manufacturing (11)	17.09	HW
Summarizing your group work and process reflection.	24.09	HW
Self-organized case study: Designkampen Source: NRK 2010, DVD film session 1-6	01.10	SA/HW
Managing Projects (16) Earthpower and Talitor AS	08.10	HL/AM
Concept Development Methods LOYDS Ulf Tolfen (Loyds)	15.10	UT/SL
Product Architecture (9), Industrial Design (10) Product Development Economics (15)	22.10	HW
Self-organized group work and process reflection.	29.10	SA/HW
Presenting your group temporary work and consulting for assignment work Internationalization seminar/Project work	05.11	HW
Feedback/comments on your project work presentations, questions/debates.	12.11	HW
Company lecture with case analysis S&S	19.11	HS/OA
Feedback/comments on your project work, questions/debates, process reflection.	26.11	HW

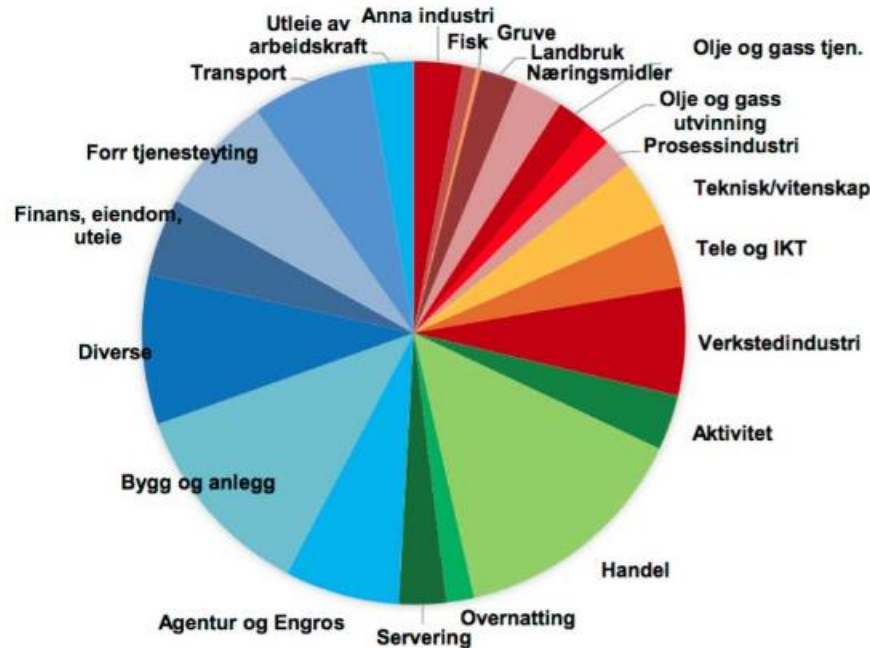
Chapter in textbook	Week	Teacher
Identifying Customer Needs (4) For service business Mimir by Ann Jorid Pedersen	07.01	AJP, SL
Identifying Customer Needs (4) For service business Mimir by Ann Jorid Pedersen	14.01 21.01	AJP
Company lecture with case analysis GlommaPapp http://glommapapp.no/ Earthtree Media by Stein Georg Lillemoen	23.01	BIL, KH
Self-organized study Career Day meeting with local companies	28.01	SGL
Patents and Intellectual Property (14) Guest lecture by Norwegian Industrial Property Office http://www.patentstyret.no KL1000-1200	04.02 05.02	
Self-organized study	11.02	Bjørn T
Company lecture for case analysis Protein AS	18.02	HW
Company lecture for case ProjectionDesign	25.02	MH
Company lecture with case TECHNICAL JOURNAL	04.03	RB
Company lecture with case TECHNICAL JOURNAL	11.03	HW
Making your own prototype/safety course	18.03	RN
Making your own prototype/illustrations 3D	08.04	SM
Making your own prototype/illustrations for your 3D samples	15.04	SM
Presenting your work, feedback, comments, consulting on your project work so far	22.04	HW
Consulting/questioning student projects Course evaluating by students	29.04	HW
Self-organized study	06.05	HW
Last minutes preparing, questions and consulting for all chapters/company cases	13.05	HW





2.1.4 Næringsstrukturen i Østfold

Om vi fordeler antall sysselsatte på næringer i privat sektor, får vi følgende bilde:



Figur 2: Inndeling av næringslivet, utenom offentlige ansatte og lokale næringer som leverer tjenester for kommunen til lokalbefolkningen. (Kilde: Telemarksforskning)

Good variety of student projects

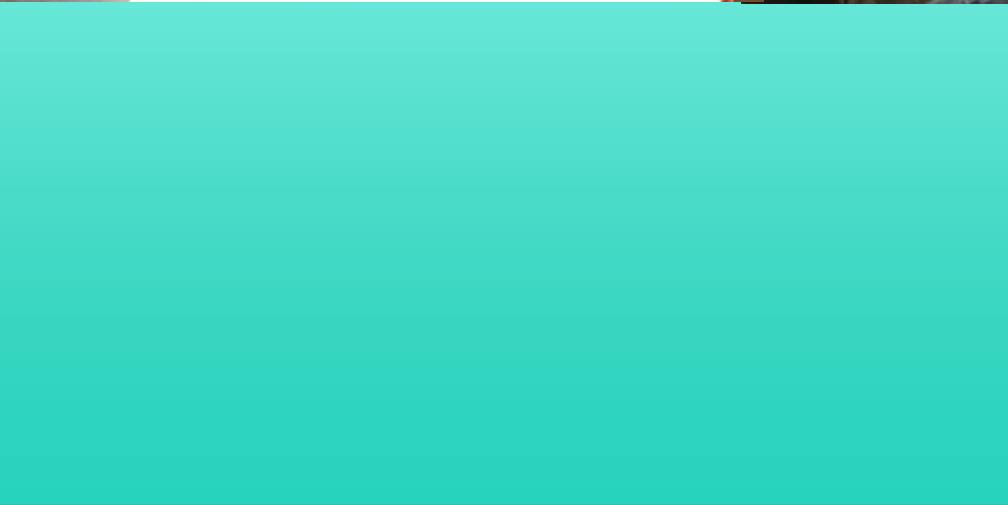
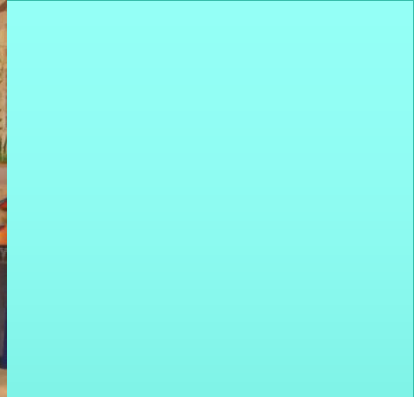
- Mini projects as assignments for the subject
- **Unit Innovation techniques**
- On demand student projects combined with a subject
- **Unit Thermodynamics**
- Full time task assigned student project appointed
- **Bachelor thesis project for spring semester**

Students learn about the companies and projects in visits and company lectures

Key successful criteria:

- Understanding industry needs
- Understanding industry languages
- Using industry cases to support teaching theories







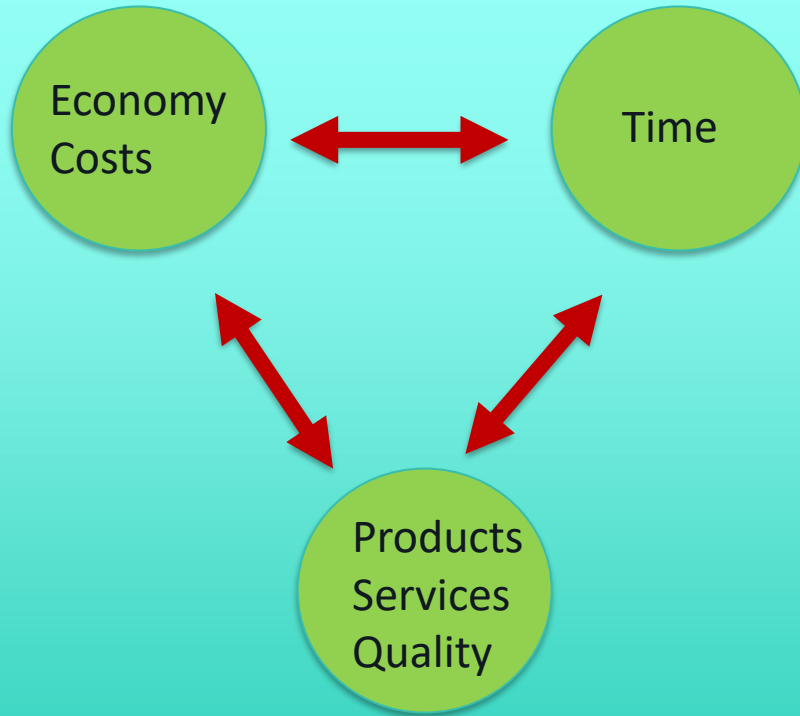
Company collaboration challenges

- **Different cultures and languages**
- **Different focuses and priorities**
- **Different markets and customers**

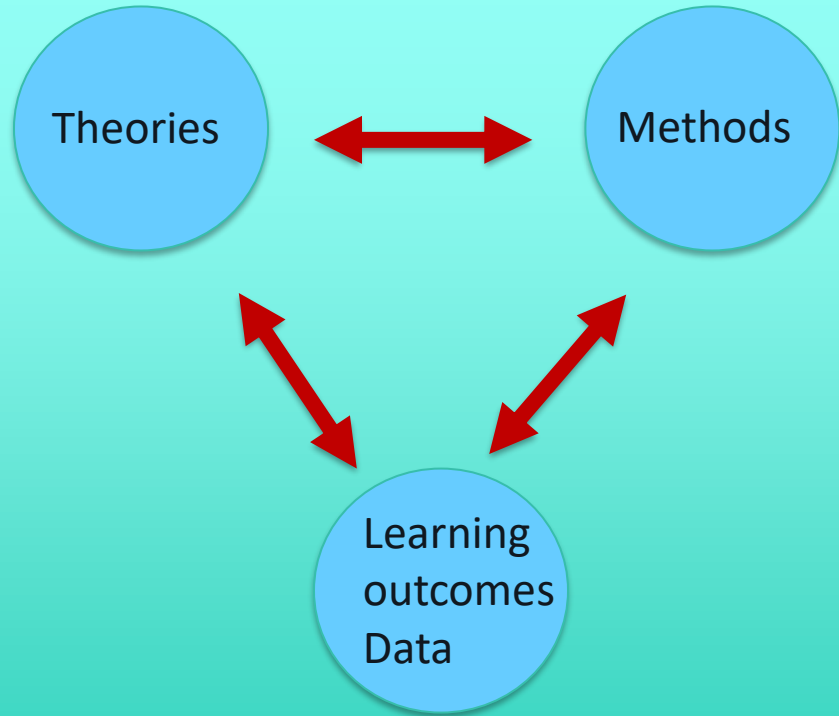
Reflections and recommendations

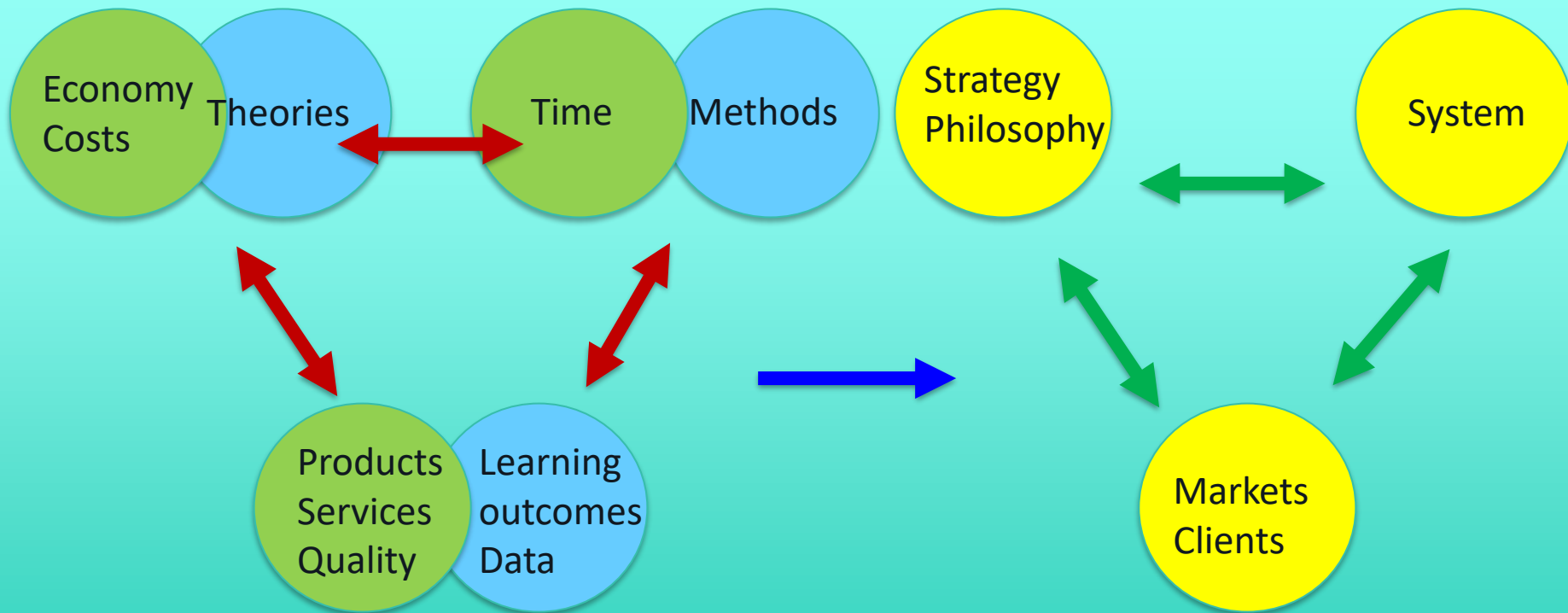
- **Respect each other**
- **Understanding each other**
- **Communicating each other**

Company world



Academic world





Collaborating options with company partners

- 1. Student placements (real skills/experiences)**
- 2. Industrial projects (real case assignments)**
- 3. Cross-disciplinary projects (real project and collaborating skills)**



Learning subject

Lean method for
teaching
evaluations



Learning subject
Organization
theories

Lectures: Consumer behavior and trends in the energy market.
Life and renewable energy.
Partners: The Confederation of Norwegian Enterprise (NHO) and Value Creation Research Project funded

Smart Cities, a real case EU-project from a college course:

Organization Development

2nd year College students as **mentors/coaches** for 110 secondary school students from the Netherlands, Scotland, Sweden, Germany and Norway.



**Learning subject
Company
placement**

**Work at your own
pace**

**Learn yourself in
unfamiliar topics.**

**Good link
accumulated
theoretical
knowledge and
the company's
practice**



Learning subject Bachelor project

EXPO 2018
14-15. JUNI



EXPO is an annual event that takes place at Østfold University College

This is an open and public presentation / exhibition of the students' bachelor projects.

EXPO presents annually approximately 60 exciting projects, mostly real business cases!

Most student projects are business company tasks related to real cases, assigned and serviced for local companies.

Prior to the EXPO exhibition, the students work individually or in groups (2-4 students) for 3-5 months

Results are presented under EXPO for teachers, clients and audiences, open and publically.

For smarte håndverkere



Unngå rot. Plass til alt. Full oversikt.



Enkel lastning/lossing og transport av store varer



Aldri mer



Unngå sm

LOYDS

SMART



New brake and locking system for opening smart trays in craftsman cars with one hand.

Student Tina Irene Thorvaldsen, Cathrine Helene Helseth and Monica Normann have developed.



Høgskolen i Østfold

Reologiske og mekaniske
egenskaper i betong med
vasket maskinsand



- Knust betongtilslag før naturlige forekomster blir utilgjengelige
- Oppnå god støpelighet med maskinsand i betong
- Utvikle et anvendelig produkt som er samfunnsøkonomisk

NORBETONG

Experts on concrete:
These students tested
and analyzed concrete
samples in bachelor's
assignment's test
production.

Now their task is
delivered with the aim
of achieving good
qualities in fresh and
tempered concrete
produced with finely
reduced machine sand.



Many visitors to the engineering student project exhibition.

A student group made a rig that safely and efficiently cleans skid MCs.

A Norwegian road authority representative showed interests.



Worked to project and develop the university's new research station in Hessdalen.

Establish a research station that allows year-end student-active research in the mountain areas where so many hunt for the explanation behind Hessdalens lysfenomen.

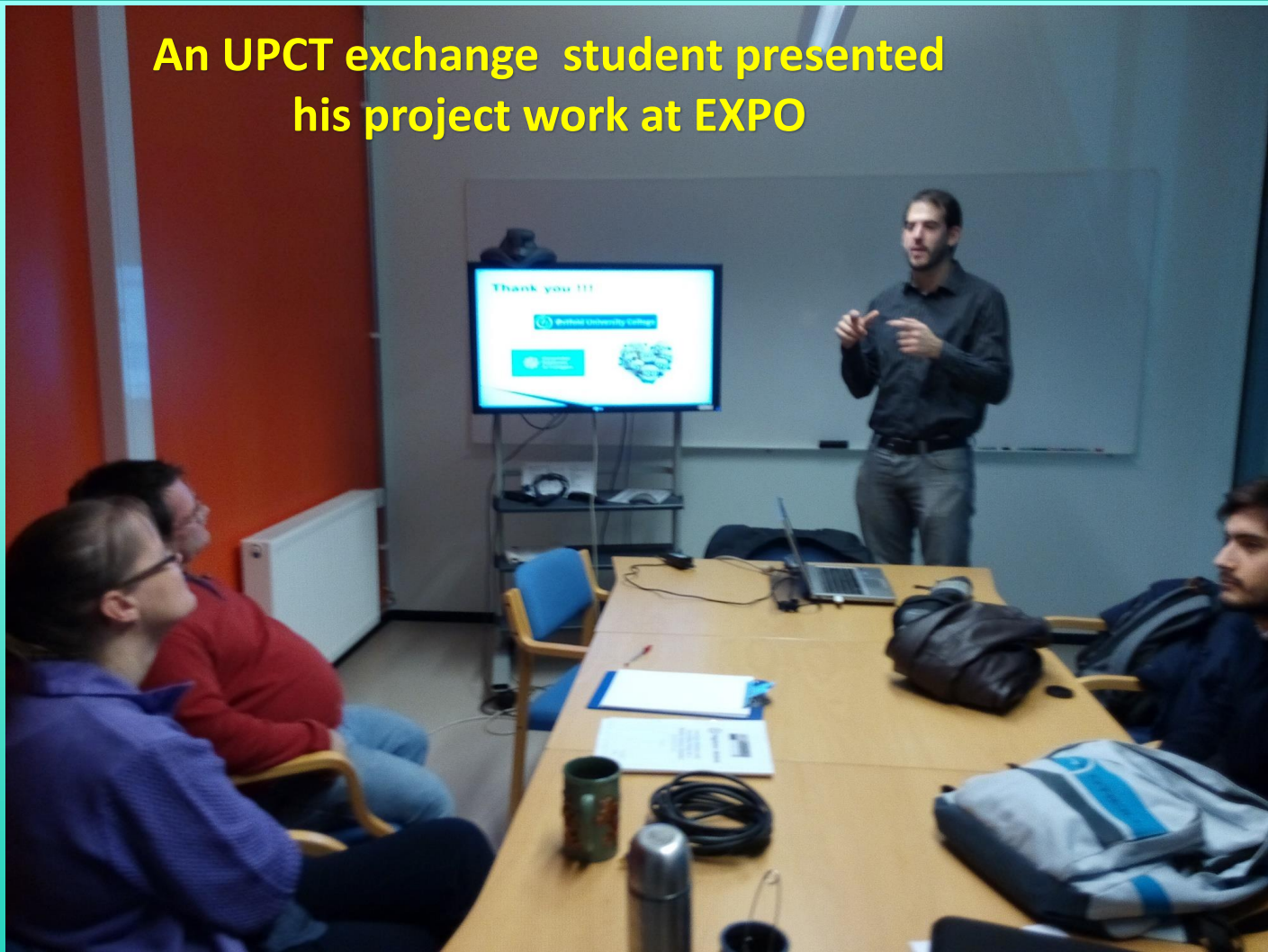
Learning subject

**International
student research
project**

**Two UCLM
exchange
student
presented their
project work at
EXPO**



An UPCT exchange student presented his project work at EXPO



10 essential skills employers need?

1. Interpersonal & communication skills (written & oral)
2. Drive & commitment / industry knowledge
3. Critical reasoning & analytical skills / technical skills
4. Academic grades
5. Cultural sensitivity/values fit
6. Work experience
7. Teamwork skills
8. Emotional intelligence (self-awareness, motivation)
9. Leadership skills (voluntary work)
10. Activities (incl. intra & extra curricular)

Shall we rethink about curriculum and new learning criteria?

Real work life focused learning curriculum and programs

- A CDIO and holistic learning package for students
- Connecting the academic and real work life
- Encouraging students learning motivations and engagements
- Networking and introducing students to career openings

A competitive curriculum for a small university college?

Questions? Comments?

Thanks!