Problem Based Learning
Surveying Education in Denmark

Prof. Stig Enemark
Aalborg University, Denmark

Department of Land and Property Science
Namibia University of Science and Technology
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Denmark at a glance

- 43,000 sq. km
- 5.5 mill inhabitants
- One third lives in the capital area
- Flat country
  - 70 % agriculture
  - 10 % urban

Aalborg

Copenhagen

43,000 sq. km
5.5 mill inhabitants
One third lives in the capital area
Flat country
70 % agriculture
10 % urban
Wonderful Copenhagen
Aalborg University – established 1974

Key numbers per 2014:

<table>
<thead>
<tr>
<th>Department</th>
<th>Students</th>
<th>Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fak. of Eng. and Science</td>
<td>8.200</td>
<td>1.600</td>
</tr>
<tr>
<td>Fak. of Medicine</td>
<td>1.700</td>
<td>400</td>
</tr>
<tr>
<td>Fak. of Social Science</td>
<td>6.000</td>
<td>450</td>
</tr>
<tr>
<td>Fak. of Humanities</td>
<td>4.700</td>
<td>450</td>
</tr>
<tr>
<td>Central Administration</td>
<td></td>
<td>600</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20.600</strong></td>
<td><strong>3.500</strong></td>
</tr>
</tbody>
</table>

**Academic staff** 2.100

**Administrative staff** 1.400
The Aalborg Model

Problem Based Learning
• Based on real-life problems

Project Organised Education
• Project work supported by lecture courses

Group Work
• Groups of four to six students
• Supervised by the teachers

Interdisciplinary Studies
• Integration of theory and practice
• Focus on Learning to Learn

Educational Innovation
through the interaction between education, research and professional practice
Project-organised and Problem-based

Project-organised:
Taught courses assisted by actual practice is replaced by project-work assisted by courses.
From description and analysing to synthesising and assessment.

Problem-based:
Textbook knowledge is replaced by the necessary knowledge to solve theoretical problems.
From understanding of common knowledge to ability to develop new knowledge.

"You only know things for sure when you are capable of explaining this knowledge to others"
Project-organised and Problem-based Learning

- Literature
- Lectures
- Internet

- Problem Analysis
- Problem Solving
- Report

- Tutorials
- Field Work
- Experiments
Lecture courses – project work …
Lecture Courses and Project Work

Project work:
a major assignment within a given subject-related framework determined for each semester.

Lecture courses
mainly on subjects within the theme of the semester
partly on subjects relating to the overall academic profile of the curriculum.
### Week schedule - example

<table>
<thead>
<tr>
<th>Time</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.15</td>
<td>Lecture course</td>
<td>Project work</td>
<td>Lecture course</td>
<td>Lecture course</td>
<td>Project work</td>
</tr>
<tr>
<td>12.00</td>
<td>Lunch</td>
<td>Lunch</td>
<td>Lunch</td>
<td>Lunch</td>
<td>Lunch</td>
</tr>
<tr>
<td>12.30</td>
<td>Lecture course</td>
<td>Project work</td>
<td>Vacant (Meetings)</td>
<td>Project work</td>
<td>Project work</td>
</tr>
<tr>
<td>16.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- A semester is equivalent to 30 ECTS points (900 hours of study)
- Each sem. includes 1 project module of 15 ECTS and 3 lecture course modules of 5 ECTS, in total 30 ECTS
- All modules are examined
The Role of the Teacher

- A three-dimensional role: Lecturer (teacher), Supervisor (coach), Researcher (scientist)
- Focus on learning rather than teaching
- On-going renewal of lecture courses
- On-going and dynamic interaction between education, research and professional practice
Project work: The Role of the Student

- Focus on learning rather than textbook knowledge
- Focus on interdisciplinary learning and methodologies
- Using lecture courses as a basis for the project work
- Focus on co-operation in developing new knowledge
- Focus on responsibility towards completing projects in time
Key Philosophy

Tell me and I will forget
Show me and I will remember
Involve me and I will understand
Step back and I will act

*Chinese proverb*
The professional profile of the surveyor in DK

- Technology Engineer
- Law Lawyer
- Planning Architect

Real Property

- Measurement Science
- Spatial Information Management
- Land Management

Surveyor

- Mapping
- GIS-systems
- Land Management
- Consultancy
- Engineering Surveys
- Cadastral Work
- Spatial Planning
The Aalborg Curriculum

Intake 1st sem. Sept. 2014: 25 in Aalborg, 25 in Copenhagen, total 50 students
<table>
<thead>
<tr>
<th>Sem.</th>
<th>Module</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td><strong>Cadastral Management</strong>&lt;br&gt;Property data, consultancy, code of ethics&lt;br&gt;Subdivision, land transfer, land registration&lt;br&gt;Specific tasks of surveyors - legal property issues</td>
<td>20</td>
</tr>
<tr>
<td>5</td>
<td><strong>Position and mapping</strong>&lt;br&gt;Data capture and modelling&lt;br&gt;Data management and assessment</td>
<td>15</td>
</tr>
<tr>
<td>4</td>
<td><strong>Large scale mapping</strong>&lt;br&gt;Surveying and mapping&lt;br&gt;Error theory and map projections&lt;br&gt;<strong>Rural areas - planning and administration</strong>&lt;br&gt;Landscape analysis and rural land-use planning</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td><strong>Urban areas - planning and administration</strong>&lt;br&gt;Urban and municipal planning&lt;br&gt;Urban geographical methods&lt;br&gt;Planning law and land-use management</td>
<td>15</td>
</tr>
<tr>
<td>2</td>
<td><strong>Real property and development</strong>&lt;br&gt;Calculus&lt;br&gt;Theories and methods, geospatial science&lt;br&gt;Legal and geographical analyses of areas</td>
<td>15</td>
</tr>
<tr>
<td>1</td>
<td><strong>Surveyors – the professional profile</strong>&lt;br&gt;Geographical information - places, data, models&lt;br&gt;Problem based learning&lt;br&gt;Surveying and spatial models&lt;br&gt;Linear algebra</td>
<td>5</td>
</tr>
</tbody>
</table>

**Total**: 180
Master Program Lecture Courses 1-2 semester

2nd Semester
Surveying and Mapping
- Sensor and Data Integration
- Small Scale Mapping
- Large Scale Mapping
- Statistical Methods in Surveying and Mapping
Geoinformatics
- GI Integration, Applications and Society
  - Geocomputation and Spatial Decision Support Systems
  - Geovisualisation
  - Remote Sensing and Image Processing
Spatial Development and Planning
- Development, Planning and Implementation
- Land Use Regulation and Land Economics
- Land Management and Governance

1st Semester
Surveying and Mapping
- Positioning
  - Positioning Technologies
  - Spatial Data Infrastructure
  - Land Administration Systems
Geoinformatics
- GI technology and Information Systems
  - Geospatial Information Technology
  - Spatial Data Infrastructure
  - Land Administration Systems
Land Management
- Land Development and Property Law
  - Real Property – Legal and Economic Aspects
  - Spatial Data Infrastructure
  - Land Administration Systems
M. Sc. - Chartered Surveyor Study Programme
New Curriculum September 2007

AALBORG

COPENHAGEN

**Master’s Programme**
- Final Thesis
- Internship - International Exchange - project work at AAU
- Land Management
- Measurement Science
- Geoinformation Technology & Management
- Property Economics*

**Bachelor’s Programme**
- Cadastral Management
- Land Surveying
- Large Scale Mapping
- Spatial Planning & Land Use Management
- Site & Residential Planning
- Maps & Spatial data

* In co-operation with Faculty of Engineering LTH / Lund University
The Quality Circle

Planning for the upcoming semester

Ongoing evaluation and evaluation of lecture courses

Assessment and decisions by the Board of Studies

Final evaluation from the students

“Without assessment of the completed semester - the students cannot expect to commence on a well-planned and improved semester”
Evolution of the Professional Profile in DK

The only constant is change
Yesterday, Today and Tomorrow
The Big Swing

- **From Measurement**
  Surveyors will still be high level experts within measurement science, but due to technology development the role is changing into managing the measurements

- **To Management**
  Surveyors will increasingly contribute to building sustainable societies as experts in managing land and properties

*The Land Professionals*
Land Administration Systems

Land Tenure: Allocation and security of rights in lands; legal surveys of boundaries; transfer of property;
Land Value: Assessment of the value of land and properties; gathering of revenues through taxation;
Land Use: Control of land-use through adoption of planning policies and land-use regulations at various levels;
Land Develop: Building of new infrastructure; implementation of construction works and the change of land-use
Geo-information

...creates a strong foundation

...for sustainable action

Source: ESRI
Place matters

Everything happens somewhere

“If we can understand more about the nature of “place” where things happen, and the impact on the people and assets on that location, we can plan better, manage risk better, and use our resources better.”

Location Strategy for United Kingdom, 2008

“Heading toward spatial enabled society”
The Educational Profile of the Future

- MEASUREMENT SCIENCE
- SPATIAL INFORMATION MANAGEMENT
- LAND MANAGEMENT

Design/build/manage the natural/built environment and connected spatial/legal rights
Professional competence relates to the status as an expert.

This status cannot be achieved only through university graduation and it cannot be achieved solely through professional practice.

The idea of “learning for life” is replaced by the concept of lifelong learning.

All graduates must have access to the newest knowledge throughout their professional life.

E-Learning and innovative interaction between education, research and professional practice is essential in this regard.
Thank you for your attention