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PROBLEMS!?

THE ÅLBORG UNIVERSITY CENTRE MODEL OF  
PROBLEM-ORIENTED, PROJECT-ORGANIZED STUDIES

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Abstract:

The structure of technical studies, such as landsurveying and photogrammetry, has, at least in Europe, generally been unchanged during the last 100 years. Starting with basic subjects (mathematics, physics etc.) the different disciplines have been lectured ex cathedra, supplemented with practical exercises in various subjects. The studies have been completed with a diploma work of project-like character.

This structure was also valid for the education of the authorized Danish landsurveyor which was located in Copenhagen. In 1975 it was relocated to the new Ålborg University Centre in Northern Jutland. Here the structure and form of the education is quite different, being problem-oriented and organized in project groups and often in an interdisciplinary relation. This paper describes the positive and negative experiences with this new education system, seen with the eyes of a teacher of photogrammetry.

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Background

This paper deals with the Danish "landinspektør" education. Based on a degree from Ålborg University Centre (AUC), and from there only, and 3 years in practice, you can qualify for a license as a chartered surveyor.

The study is, as the profession, a combination of the subjects: surveying (geodesy, photogrammetry, cartography), cadastral science (administration, law), and planning (especially local). As will be seen later, there is a great freedom in choice of subjects. Out of a total of abt. 8000 hours, only 2800 are obligatory. Of these abt. 1300 is surveying, and only 120 h are "clean" photogrammetry. But if you specialize at a maximum, you can add abt. 2400 h to any subject.

Until 1975 the study was traditional in structure, and only little specialization was possible. For political reasons it was then relocated from Copenhagen to the new Ålborg University Centre, with faculties for technology, social science and languages and education.

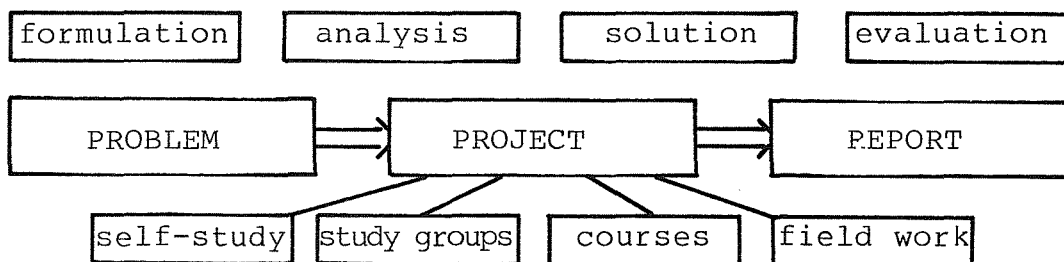
This was a drastic change. Everything was turned upside down. Structure, pedagogical goals and means, weight of subjects and, not least, form of management.

Model

Problem-oriented, project-organized, student-centred and -managed groupwork were the words.

From the very start, and at all levels, the student is working at projects, occupying at least 40% of the total study. Projects are performed in groups of students, varying from 1 to 8 persons, generally 4 to 6.

Within certain frames, the group is choosing a problem from "real" life. The problem is formulated and analysed, solutions discussed and tried, and a final report is written. Problem-solving is supported by relevant courses, study groups, self-study, and experiments.



The teacher is acting as a tutor or instructor, having more pedagogical tasks than usually.

Courses are mostly closely related to the chosen problem. They are given in blocks of 24 hours, and in units of 4 hours. These are often spent with a 1-2 hour lecture for 4 to 6 groups, followed by small exercises or problem solving in the day's subject in the group, and a final discussion.

The work of the student is evaluated runningly by the group tutor, and at the end of each term ( $\frac{1}{2}$  year) with a final evaluation of the project report. 3 times during the study external censors are taking part in this evaluation.

No marks are given, except for the final examination, as the evaluations are considered more as a guidance for the student, how to improve his study, if necessary. There are some sanctions connected to these evaluations, mainly like re-working or -writing parts of a report.

These ideas are of course not unique for the AUC. They are discussed worldwide; many of them coming from the U.S.A. But in Ålborg they are put through to a greater extent than usual in Europe.

Compared to the traditional discipline-oriented system of education, they are expected to give a greater degree of motivation for the student, and also giving a better training for the working conditions in the students' future occupation.

#### Performance

How do you place a survey student in this system.

All studies at AUC start with a one-year basic training, one for each faculty.

In this year there are no specific sectorial subjects taught. The idea is that the student can make his final choice after this year.

For the technical faculty the student can go to various branches of civil engineering (and at two levels: B. and M.Sc.), surveying and mathematics.

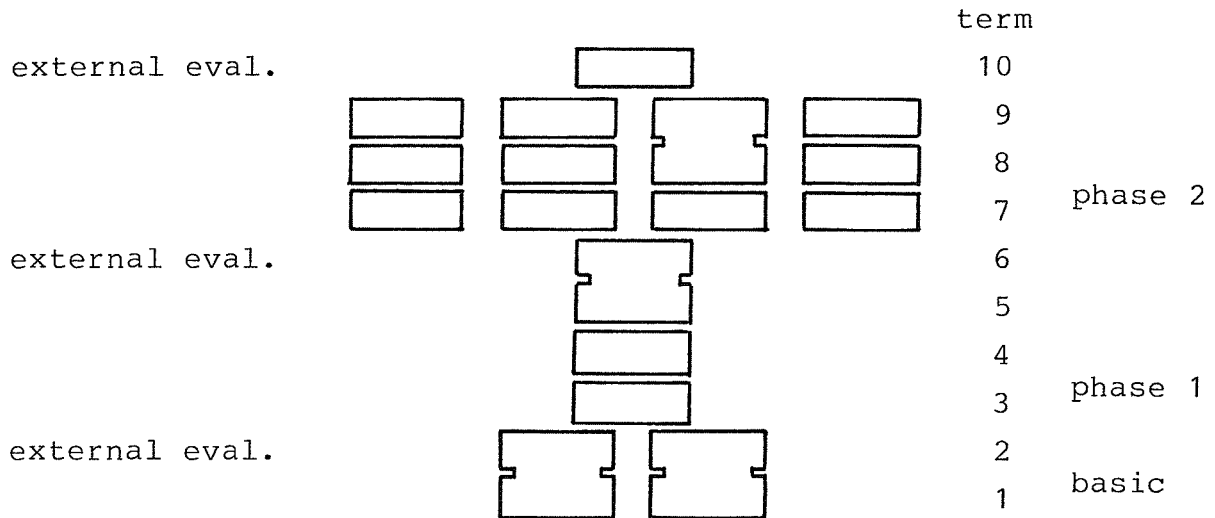
The survey student can also come from the basic year of the social science faculty, where students also go into economics, social subjects, administration etc.

The main purpose of the basic year is to make the student used to project study, and to give him some general background about theory and methods used within the field of the faculty.

On this background the surveying student starts with an obligatory phase of 2 years.

A second phase of freely combinable subjects fills out the last 2 years.

The following diagram shows the structure:



A project lasts at least one term. In phase 1 the subjects or themes are:

- 3 : Urban development
- 4 : Country planning and legislation
- 5+6 : The formation of real estate.

The themes are an attempt to work with different subjects in the way they are related in practice. Let us exemplify with the 5th and 6th term:

The purpose is to create a new living area.

At a given locality the property boundaries are reestablished, and a survey is done. A town plan is designed, and all cadastral and other legal considerations are taken care of. The new boundaries are computed and finally set out.

Beside documentation of the case, the report discusses all steps and methods used.

To support the work courses are given, e.g. mathematics, adjustment, detailed survey etc. Other, more general, courses are given to create a background, e.g. photogrammetry.

Another, smaller project, is more direct: Produce the background for a large-scale photogrammetric mapping. This involves specification of number and quality of pass-points, selection and determination, including densification of the national trig. net, and finally evaluation of the chosen points in a photogrammetric instrument.

In phase 2 the student decides whether he wants to specialize strongly or take a wider education. In the 3 terms, 7-8-9, it is possible to choose two survey themes:

- 7 or 9 : Mapping
- 8 : Technical survey,

giving possibilities of working with geodesy, photogrammetry or cartography.

The final diploma work (10th term) is done in a subject you have already had at least 1 term earlier.

### Experiences

This summer we are finishing only the second class, and our experiences are of course limited. But some trends are showing.

#### Problem:

There is, from student-side, a tendency to think, in the spirit of the whole university, that any "problem" must be of a social nature. This leads to very general projects, often with little content of technical disciplines like mathematics, EDP, etc.

I think this is a reaction against earlier times with very discipline-oriented education, where relations to society were neglected. This will be adjusted with time.

It might also be due to the start in the basic year, where the student learns that he must formulate a problem himself, at a time, where he has not got a very technical background.

But it also falls back on the tutors and their lacking capabilities of describing technical problems in a sufficient interesting way.

#### Project:

The project work itself is a very good way of learning. Actually it has, to some extent, always been used in our education. The student is forced to work himself, not only to listen. Our experience is that he really works hard.

In our model the necessary disciplines should be asked by the students, when they need them in their projects. This does not really work. It is impossible to organize in a practical way, and often the students do not see the need, as mentioned above. We must find a better balance between disciplines and projects.

#### Group:

The group work was introduced for various reasons. It is supposed that people work that way in modern production, and that in this way, the "strong" would help the "weak".

Individual studies are, although possible, very seldom.

After the first few terms, a strong self-sorting procedure takes place. Not surprising to an old teacher, the "strong" students find together and the "weak" form "rest" groups.

If a student does not work properly, he is expelled from the group, and must go on individually, often losing.

The quality of the reports from different groups is thus varying considerably.

#### Teacher:

Building up a new system is of course troublesome. In our case the teachers, and the proper use of their qualifications, have

caused maybe the greatest difficulty.

The technical faculty consists of integrated institutions, like ours. Very few new teachers have been appointed, whereas the other faculties have a new and often very young staff.

None of us have been trained for this type of education, and in the building-up period no time for special training has been available.

The change of power from professors to governing institutions (50% students) has been drastic. A teacher is a teacher, whether youngest assistant or most experienced professor; only the salary is different.

These circumstances have given a lot of frustrations among the experienced teachers, and a certain polarization between the "progressives" (young) and the "reactionary" (older than 35).

Allocation of teachers to a certain theme is, for planning reasons, done about  $\frac{1}{2}$  a year before the term starts. At this time it is not known what projects will come up. For "Mapping" for instance, a surveyor, a photogrammetrist and a cartographer are assigned, if available. If then all groups choose a cartographic problem, sufficient professional knowledge is not there, and the photogrammetrist is tutor in a subject he only knows superficially. Of course, he would prefer to teach his own subject, and of course, the quality would then be better.

This leads to teachers with a general knowledge of everything and no specialization, a point that strengthens the effect of the students' choice of very "general" problems.

A good project teaching is quite time consuming and is not a cheaper way than classes and exercises, as the planners originally thought.

However, if you get a good group, and in a subject you are interested in, this type of education is very giving, for students as well as teacher. And for the specialist, it is not bad to be forced to see his, often narrow, discipline in a wider context.

Practical conditions:

Also most outer circumstances are changed.

Each group must have its own room for its project work, and there must be seminar rooms for courses (4-6 groups).

The demands for instruments and laboratory facilities are quite heavy.

During the obligatory projects all students will need instruments at the same time. It is not easy to make rotations, as is done otherwise. Only for the use of larger instruments, like photogrammetric plotters, it is necessary to make ordinary exercises, but also here you need a great capacity, as time is usually short.

For later projects (7-10th term) it is difficult to plan the instrumentation. You try to be prepared for everything, leading to a low degree of utilization for some instruments.

As the students will often go out in the field, there must be transportation or money to pay for transport, and care must be taken not to "over"use an area or the local administration.

Time will be short for purchase of aerial photos, maps etc., so you must have good contacts.

### Conclusion

This is a somewhat kaleidoscopic image of small and great problems in our new teaching system. As might be noticed from the presentation, I am not too happy about all the results. But of course I am by definition (my age), a reactionary. If you ask somebody else, you might get any other answer. I have tried to show some weak solutions, seen from my point of view.

But nobody wants to change back to the old system. The advantages are obvious and in excess. It will still take some years, many in the eyes of the young, fewer to the older, to get settled.

In my opinion we have unsolved questions concerning the teachers; how to use their qualifications reasonably, how to make a better allocation of them.

We also must find a better balance between basic disciplines and projects, and see how to ensure reasonable contents of all studies.

What do we do about the selective group formation? The present free formation tends to make the good student even better, the weak student worse than in other systems.

And the projects. Can you still find new problems every term? What is "real" life? Do you create a special university society?

And finally, and maybe decisive, how will the continuous cutting in budget we have in these years influence the model?