

FROM THE INDUSTRIAL TO THE POST-INDUSTRIAL SOCIETY IN 25 YEARS - AS SEEN BY AN ENGINEERING EDUCATOR

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KURZFASSUNG

Dieses Papier beschreibt und diskutiert kurz die Veränderung der Rahmen des Ingenieurpädagogen über die letzten 25 Jahre. In 1973 hatten die Pädagogen eine stabile, doch vom Ministerium abhängige Arbeitssituation. Trotz dieser Abhängigkeit konnte der Ingenieurpädagoge relative hohen Status und Bezahlung genießen. «Pensum unterrichten» war das Ziel. In 1998 hat der Lehrer seine Freiheit gewonnen. Diese neue Situation ist mit Unsicherheit, geringem Lohn und Status gepaart. Jedoch, «Pensum unterrichten» ist von «lerning Prozess» als Ziel abgelöst worden und Forschung ist eine neue Möglichkeit. Der Lehrer entwickelt sich zu einem «Direktor für Lernprozessen» und seine Realkompetenz wird für die eigene sowohl für der Schule's Ökonomie wichtig.

1. TRAVELING INTO THE POST-INDUSTRIAL SOCIETY

By entering Oslo by train from the west in 1973, the passengers during the last 4 km passed through beautiful residential areas spiced with mechanical workshops. These were, according to Norwegian standards quite large and produced pumps, turbines, locomotives, coaches and power equipment like transformers and water powered generators. The neighbor of the Oslo West Railroad Station was a shipyard for the building and maintenance of even large ships.

Entering Norway's capital along the same route in 1998, the traveler is introduced to even more beautiful residential areas. In addition, the train will pass engineering, import and distribution companies spiced with logos of the computer business. Next to the old railroad terminal, the shipyard has been transformed into a shopping center.

The transit of these four kilometers may illustrate the challenges of the engineering profession, as it so aptly describes the changes of the framework under which the engineering educator has had to adjust.

2. CHARACTERISTICS OF ENGINEERING EDUCATION ANNO 1973

2.1 SHORT DESCRIPTION

In 1973 engineering education was designed to fit the highly motivated youth, showing maturity already as teenagers. The society at large was still reflecting a stabile world; its basic values had yet to wait to be seriously challenged.

One of the "basic values" could be labeled Power from Above; the last word meaning the Ministry for Church and Education. This thinking set the frames for the engineering educator's working conditions:

- 1) The school of 1973 had *pupils*, even if they might be over 25 year old and holding trade certificates. Admission was highly competitive, securing the presumptive best pupils, who were supposed to learn the curriculum
- 2) The teaching process was ruled by the weekly schedule, chaining the pupils to their desks and laboratories 8 hours a day, 6 days a week in addition to homework. This resulted in conscientious, hard-working pupils, having no time for disturbing activities. Their teachers were pleased by the good final grades after excellent curriculum reproduction
- 3) All planning was *centralized*. Committees at the ministerial agency level decided the framework, the normal weekly schedule, the curricu-

- lum, the elements of each course, and suggested even how to teach the subjects
- 4) Since it was assumed that a certain amount of fixed knowledge represented an indication of the *academic level*, most final exams and grading were done on behalf of the Ministry of Education
 - 5) Consequently, the teacher's task was to teach the curriculum, give and grade tests and conduct the final examination according to the common rules
 - 6) The faculty's teaching load was 24 hours a week; 4 to 10 of these were spent in the laboratory, watching pupils at work
 - 7) The teacher did not have any other obligations. Except for the hours assigned for teaching, the faculty was not expected to stay at school. Summer vacation run for 8 weeks without a need to communicate with the school
 - 8) The teacher's basic salary assumed 24 hours organized teaching per week. But from this base the pay was linear, for instance: 30 hours a week would yield the salary $\times 30/24 = 125\%$ of normal pay. Teachers then, could enjoy a handsome overtime pay, all well inside "a normal day at work", as outsiders used to put it. Teaching many classes a common curriculum, using the given textbooks did not have to spend time on course development. Consequently, they were awarded, as they had time for «overtime» teaching
 - 9) The teacher's salary was fairly competitive, and reflected the social and professional status of teaching a selected group of adult pupils
 - 10) The interaction between "the outer world" and the engineering schools was mostly through the Ministry, even if attempts were done to have this altered
 - 11) The teacher's position was *safe and stable* with respect to having a position protected against lay-off and unexpected changes in curriculum, methods, etc.
 - 12) The stability may be said to have been "guaranteed" by industry of the types found along the west side of Oslo - all of them serving the home market

2.2 SOME EFFECTS OF THE 1973 SYSTEM

Numbers 3) through 7) above emphasize the strong dependency of the average teacher. One major result was the virtual absence of individual research, neither technical nor educational. At that moment this caused few problems, as there were always correct answers at hand from the Ministry, Rector - or the textbooks. The effect of the emerging new tools like, for instance, the handheld calculator was

considered a threat to the academic level and banned for more than a decade.

These five numbers even described a situation of clarity, stability and safety. There was no room for the unexpected and disturbing - only for minor adjustments, mostly at the syllabus level.

It is not without irony it can be observed that, in those days the teachers enjoyed fairly high relative pay and a well defined and comfortable social status.

An important effect of all numbers above in general and the numbers 6) thru 11) in particular, was *isolation*.

3. CHARACTERISTICS OF ENGINEERING EDUCATION ANNO 1998

3.1 SHORT DESCRIPTION

While the 1973 situation could be labeled as «teaching from above», a label for the 1998 expectations may be formulated as «administration of learning processes». In 1973 the pupils were the targets, twenty five years later *learning* represents the target. Among others, the following numbers describe the engineering educator's working conditions of 1998:

- 1) The engineering schools have *students*. These are offered work loads measured in credits, and are given suggestions about how to attack their problems. In addition, they are *offered* lectures and their faculty is present in their offices. The admission is *not* competitive, the students find time for «a lot of other things», they are *not* satisfied with the curriculum, and they do *not* reward their professors with excellent final exam grades
- 2) The teacher *does not* receive any authority from above. In stead, there is given a *framework* of suggestions about what may be considered fundamental and characteristic to the courses, and it is assumed a «load» for lectures. An office is provided, and the weekly schedule has been replaced by office hours. Accordingly, the long summer and other vacations have been replaced by what is normal vacation for public servants in Norway
- 3) Gone are the days when the creative part of the faculty was punished economically by not having the chance of taking «overtime». Now each teacher has equal basic salary (fairly low) according to their academic rank. But documented creativity may increase the salary. An essential

- part of revenues created outside campus are secured for the part of the staff involved
- 4) Thus, extramural activities are encouraged and rewarded. A growing network linking the schools to their surrounding communities is one result
 - 5) The faculty are facing an insecure position as to employment, eventual acceptable salary and relevant professional clarity

4. SUMMARY

The last 25 years have brought forth important changes into an engineering teacher's life. This has happened in parallel with, and been moved by changes in the economy and production life due to globalization, a process that may be attributed to the advance of technology.

The paramount change may have taken place on the ideological level. This was aptly formulated by Lyle Feisel, the American Society for Engineering Edu-

cation's (ASEE) President in the December 1997 issue of «ASEE Prism»: *Teaching doesn't matter - learning is the key.*

This signals how the role of faculty irrevocably has been toggled from "teaching the curriculum" to "facilitate learning processes". From a position of security represented by dictating selected knowledge, the teacher has been forced to accept the insecure position as an *administrator of learning processes*. Focus has shifted from technological content to the *human development of students*.

The successful "facilitator" of such processes should master a number of tools for the enhancement of student development. The responsibility and demand for independency are high-leveled, as measured by any known standard.

Maybe "facilitator" is a too modest label and that 1998 sees the emerging "directors of learning processes" entering the arena?