THE DANISH REVOLUTION IN DESIGN EDUCATION

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ABSTRACT
During the last ten years the structure in Danish design engineering education has changed a lot. Attempts to set up educations with a strong blend of designing and engineering skills have broken a long tradition of industrial designers graduating only from beaux-art schools or arts and crafts schools.
Despite the instant success seen in intake numbers, low dropout rates, high popularity in the industry and an extraordinarily fine employment rate, these educations are up against static conceptions by the professional organisations and also government resistance. This paper describes the principles and results of the first Danish education of this kind at Aalborg University and outlines the paradoxical resistance and conservative attitude that such educations are still fighting against.

Keywords: Design education, engineering education, design engineering, Aalborg Model, PBL, revolution, Danish Design, University,

1 DESIGNERS AND ENGINEERS – FROM TWO DIFFERENT PLANETS?

Throughout the 20th century Danish industrial designers (IDs) have mainly received their training from two types of publicly financed institutions:

1. DESIGN SCHOOLS that build on an arts and crafts tradition that works primarily with handicrafts from textiles, glass and ceramics to cabinet making and interior design.
2. ARCHITECT SCHOOLS or academies of fine art where industrial design is seen as an architectural specialization like urban design, landscape design, architectural design and furniture design.

ID educations at the above mentioned institutions build on project-oriented curriculums, typically with a user-oriented focus, attention to form and only little attention to commercial and cross-disciplinary aspects. [1]. These educations do not broach the technical or scientific angle to design, but in general focus on artistic and aesthetic quality.
Thus, for many years, the technical scientific area has been practically non-existing at these educations, while the technical scientific aspect of design has been taught only at the engineering educations, which in turn all but left out the aesthetic dimension during the 20th century.
This segregation of arts and technical science can create prejudice and a lack of professional understanding between the engineering educations and the design

educations and has left the candidates with not only very different methods and tools but also with very different terminologies, language and professional self-understanding. As if the candidates came from two different planets. This fact can be seen as a hindrance in developing products in a more complex and holistic design process where the integration of both technical and aesthetic matters is important.
A similar barrier has been known among Danish architects and building engineers, who both traditionally lack elements of cross disciplinary integration in their curriculums. The lack of technical skills at the existing architect educations has been the object of continued criticism. [2] Also, the high unemployment rate among traditional IDs has been criticized since the 1990's and recent governmental reports [3], [4] also conclude that the traditional educations in architecture and design should be adjusted more towards the needs of the professions.

2 DANISH DESIGN EDUCATION – TRADITION OR MONOPOLY?

Danish Design is often claimed to have its origin in low-tech well-designed products such as furniture and domestic articles developed by architects in cooperation with small industries and workshops during the 1950's and 60's. The success in this area continued through the end of the century as new more technologically advanced categories such as Hi-Fi-equipment, health care equipment and other B-2-C products came along and became highly successful and prize winning products.
Typically, such products would be the result of fruitful and strong cooperation between engineers and IDs, thus, crossing the previously mentioned cultural barrier.
Globally, the typical tasks of a design office have now developed to include slightly more communicative and strategic tasks, product/service development, user involvement and creativity management, and such tasks will probably still be the typical core competence for the IDs in Denmark and similar countries for many years to come.
Up until the late 1990's the Danish architect schools and design schools held a monopolistic position in design education and this might be the reason why no major changes were seen in the area of design educations before Aalborg University (AAU) set up a new initiative in 1997. An initiative that broke the long tradition of Danish IDs graduating from beaux-art schools or arts and crafts schools only.
All AAU educations are based upon the same specific educational principles that has been developed at this university since the start in the late 1970's. The AAU- model combines Project Based Learning (PBL) and Project Organized Learning (POL) so that group based project work and course- and lecture-based assignments are examined through the students' use of knowledge and skills in their projects. [6] These new pedagogical methods were implemented in social sciences, humanities, natural science and engineering at AAU, and although such methods were significantly different from the traditional teaching methods used at the old universities the new PBL/POL teaching principles showed fine results in all educational areas after a few years [6].
Today, the engineering candidates from AAU are appreciated by the industry [7], typically because their expertise in group work and their focus on problem solving in context are well developed in comparison with candidates from traditional engineering educations.
Due to the above mentioned success, the university management of AAU has continuously strived to build up new PBL/POL based educations in new areas. Therefore, AAU made a survey among studios, companies and related stakeholders to clarify the specific demands for future professionals in the area of architecture and design. [5]

The result of this investigation showed a demand for candidates who were able to collect complex data concerning user demands, legislation, technical matters, production etc. and who could handle this data in a complex integrated process and create highly satisfactory solutions that were well-documented both technically and aesthetically. The new candidates should be able to use the new digitally based medias and models for design and presentation at a higher level than traditional candidates in the field.

The new Architecture & Design (A&D) program at AAU was subsequently set up with the following characteristics:

1. The A&D program should be research-based,
2. Information and communication technology (IKT) should be fully integrated as design and modelling tools,
3. the students should master oral as well as digital presentation,
4. the students should work primarily in groups and learn through PBL/POL,
5. the program should consist of both technical and design related methods, tools and theory,
6. the designing skills should be on a level comparable with existing architecture and design educations in Denmark, and
7. the program should teach an innovative and praxis-related approach involving strong cooperation with external partners.

Aalborg University hereby offered a full candidate program in Architecture & Design (A&D) as an engineering education with specialization in Architecture, Digital Design, Industrial Design and Urban Design. The curriculum was organized so that engineering teachers from the technical departments and teachers of architecture and design from the new and more aesthetically oriented Department of Architecture & Design would teach the core competencies of their professions in a well-balanced blend supported by teachers from social science departments at the university. It was a difficult process to blend the different professional attitudes and traditions, but now the iron wall between these fields have been broken and replaced by mutual respect and cooperation.
The initiative can, thus, be seen as a strategic move of a university that focussed on entrepreneurship and constantly tries to set up attractive educations in new fields by using the PBL/POL concept, which constitutes the overall educational principle of this university. But this move also set up new standards for architecture and design educations that had never been challenged before.
The most obvious changes are therefore that the new ID program

1. are mixing the professions of both the engineers and the industrial designers,
2. are based on PBL/POL education and group project work, and
3. take place at a university and not on design schools or schools of architecture.

Today, the A&D study program at AAU is based upon the Bologna-model (3+2+3). In the bachelor program the students integrate the technical and design-related areas in a broad architectural and design-related context and specialize in, for example, industrial design during the last two semesters of the three-year program. The bachelor program is then followed by a two-year master program taught only in English within the chosen A&D-specialization.

The established architect and design schools were not happy about this new initiative and their claim, that there was no room for new educations in this area, was probably rooted in the fear that the new graduates would undermine the employment rate for the traditional architects and designers even further, but also in the fear of undermining the quality brand established in Danish architecture and design by introducing a new competing professional profile with less focus on the artistic values.

It should be mentioned, that while the old architect and design schools are administratively connected to the Ministry of Culture, the new Department of A&D is a university program and therefore administrated by the Ministry of Science, Technology and Innovation. Therefore, the new ID programs also challenged the monopoly of the Ministry of Culture concerning architecture and design programs and Aalborg University has had a hard time trying to convince the Ministry of Culture that they could not claim ownership to the word 'design' in describing the content of educational programs!

The monopoly on design programs was also recently questioned in a 'political manifesto' of the Danish Designers Organisation which argued that the professional Danish design programs preferably should take place at the universities managed by the Ministry of Science while the handicraft-oriented schools should still be managed by the Ministry of Culture. [10]

One argument that supports this position is that the candidates from A&D at AAU quickly became attractive employees in the Danish industry and design studios. Around 85% typically find employment within the first year after graduation and 95% after two years. [8] These numbers exceed those of the traditional architect and design programs [4] and this despite the fact that new programs are often met with some scepticism by the labour market.

In general, the candidates from A&D cover the same tasks as the candidates from the traditional design schools or architectural schools, but they are also hired specifically to work as mediators on projects where engineers and designers/architects have to find integrated solutions on a conceptual and/or detailed level. Besides the ability to do interdisciplinary group work and integrate engineering and aesthetics, the graduates surveyed also emphasize that the employers of the IDs from AAU looked specifically for competencies in digital design and communication, ability to specify the demands of the users, project planning and management, idea development and innovation. [8]

While "The Association of Danish Designers" (MDD) and "The Danish Union of Architects"(Arkitektforbundet) quickly accepted the new education at AAU, "The Architects association of Denmark" (AA) and "The Society of Danish Engineers" (IDA) have been more critical. IDA has followed the education closely to ensure that the technical level and focus is sufficient to graduate as Master of Science in Engineering, and AA has refused to even discuss the possibility of supporting an approval of the new Architecture & Design programs at AAU in relation to the EU-regulations in this field. This excluding attitude exposes the politics of a conservative profession, which deliberately ignores the fact that the new AAU-program [9] apparently meets the demands of the newest EU-regulations [11] in this field to a greater extent than the existing programs.

3 THE PBL/POL MODEL VERSUS THE GOVERNMENT

A few years after the introduction of the new programs in Aalborg, engineering faculties at other fully publically financed Danish universities in Sønderborg, Copenhagen and Odense set up design educations with familiar but slightly different curriculums. In

2007, the new engineering programs at AAU and similar programs saw an intake of 280 students. In comparison, the total intake at the four 'traditional' architecture and design schools was 579 students. This means that in a few years, the number of graduates with the integrated design profile will be half as many as the number of graduates from the mainly aesthetics-oriented educations.

Most of the new educations offered use the PBL/POL-model with groups working on projects in close relation with external partners such as companies. Although these programs are clearly not as individually focussed as the traditional architecture & design programs, they also involve shorter individual projects with individual examinations in specific areas. To ensure that students of the new and more group project oriented educations will still get a fair individual evaluation of project related courses, the PBL/POL oriented universities, therefore, have developed practises where each student is examined individually and given a specific individual grade based on an examination that includes the group's project presentation and a several hours long discussion with the examiners with the whole group of students being present in the examination room.

Over the last 25 years, the Danish public schools, high schools and similar educational institutions have also implemented the PBL principle either through shorter projects or as a general principle of teaching. But in 2005 the liberal-conservative government majority started a process that challenged the PBL-principle in the whole public education system by prohibiting the use of examination procedures with more than one student present at a time[12], ignoring massive protests from the Danish universities and other educational sectors as well as from the corporate world.

The government argued that group project based examinations would not ensure a fair grade to each individual student. The university vice-chancellors, on the other hand, unanimously pled the importance of each university choosing an examination principle that best suits the educational principles and focus of each university. [13]

4 A LESSON TO BE LEARN?

The authors of this paper have been deeply involved in the development, management and teaching at the new design engineering program at Aalborg University, and this paper expresses some of the good intentions and results from starting up a process that can hopefully add a more vital, cross-disciplinary and cooperative element to the area of architecture and design. Still, we find it relevant for the community of designers and engineers to get an insight into some of the problems and frustrations that arise, when setting up new educations that cross the traditional professional borders and challenge the monopoly of a ministerial domain.

Also, we find it relevant to mention that although PBL/POL have now been used for more than 30 years at the youngest of the Danish universities and delegations constantly ask for advice on how to implement these modern principles at universities all over the world, these days the PBL/POL principles are still met with political resistance.

Although these principles have been praised for strengthening actual skills and values like motivation, efficiency and teamwork, for higher student pass rates and for the students' learning ability [14], the introduction of the individual examination has weakened the possibility to do in depth examination of the process and project related skills at the Danish universities. As the decision to dispense with group examinations has not been taken on the basis of scientific documentation this form of examination results in general rather than individual grades, they might be seen as merely a political tactic.

Several related design programs in Europe and elsewhere are considering implementing the PBL/POL-principles and the multidisciplinary aspect in their curriculum. Therefore, it may be worth considering some of the points made in this article when the planning such a process. Despite actual political attitudes and conservative professional organisations and governmental institutions, we are still convinced, that this little revolution in the Danish educational environment of architecture and design has been an important step towards strengthening the industrial design profession and its implementation and value in a society that needs designers to solve problems of increasing complexity.

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