JOELHO

04

ENSINAR PELO PROJETO
TEACHING THROUGH DESIGN

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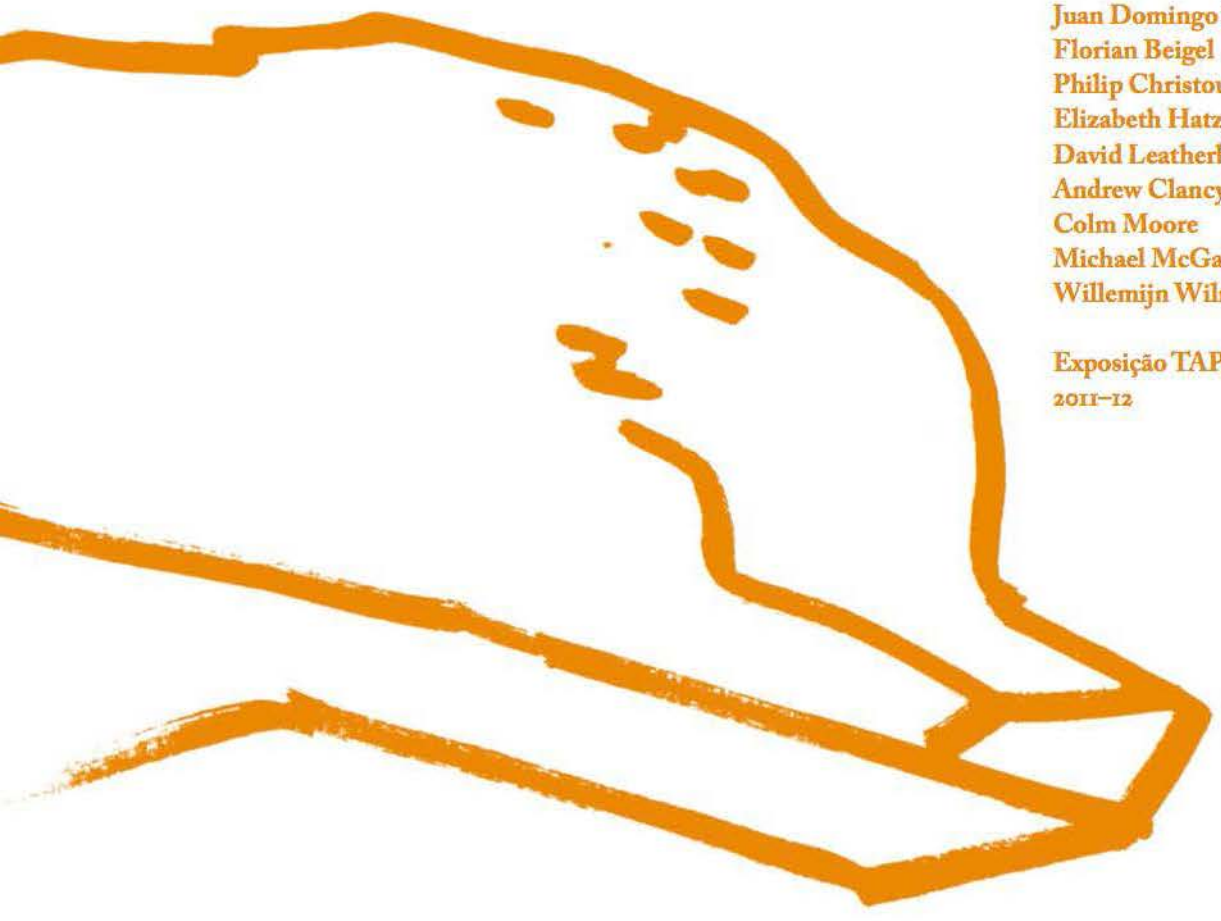

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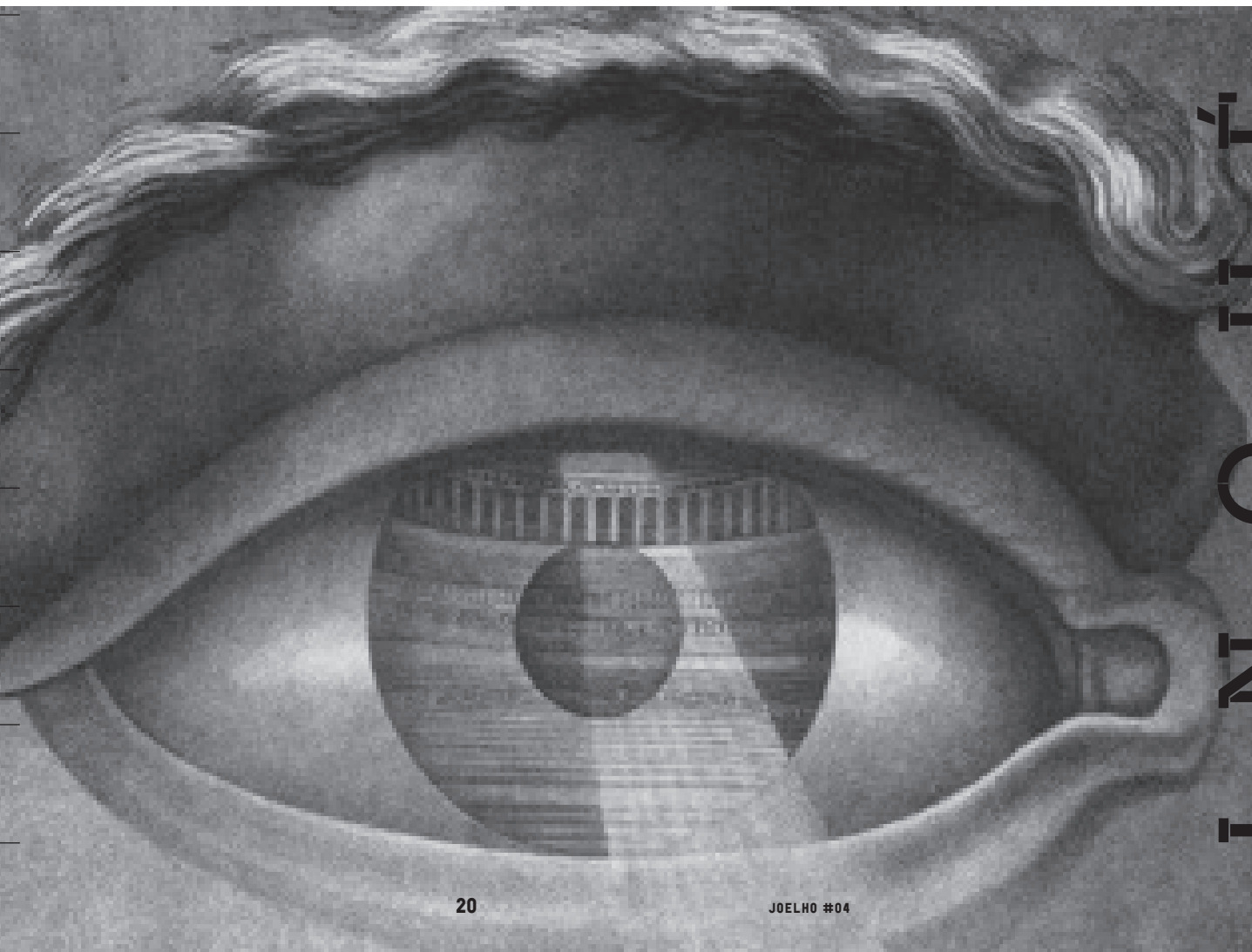
BSc curricula in Architecture*



The international perspective on schools of architecture is a topicality. The structure of architecture education programmes is more uniform since the European Union Bologna declaration was established ten years ago. A five years programme subdivided in a BSc and a MSc phase is widely accepted beside some exceptions (like the department of Architecture in Coimbra). New European accreditation criteria are an upcoming fact that schools of architecture have to deal with to be acknowledged. More and more universities offer a full English spoken programme by which the education in architecture has become 'international business' and a strategy to acquire and strengthen its reputation. Next to the temporary exchange of students who follow just a semester, foreign students following a complete BSc and MSc course are a common phenomenon too. At the Faculty of Architecture in Delft nowadays 30% of the MSc students come from abroad.

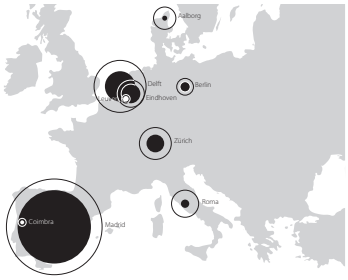
So, the simple question 'who are we amongst others?' is about 'positioning' as well as about a better understanding of the international students visiting us.

The BSc curriculum of the Faculty of Architecture at the Delft University of Technology is facing a major transformation from September 2013 onward to improve the tempo of studying, which is a general problem of academic technical studies in the Netherlands.[2] Change of the programme is imposed by a ministerial decree. At the same time this operation will be used to actualise the programme and shake up 'design education methodology' which could be considered as periodical maintenance. This was another justification for carrying out this survey. A national Dutch fund to promote and improve academic education in technology (WO Sprint) gave us the opportunity to carry out a comparative study on the curricula of schools of architecture as a mirror for our programme.

Curricula in the field of architecture and the built environment are complex matters. Most study programmes are a result of long lasting faculty traditions and sometimes complete new didactical models overthrew old establishments. The backgrounds of a curriculum are not always explicit and uniform: some architectural education institutions belong to a university in the field of technology others in the field of humanities. Different study cultures exist: full time education programmes differ from a situation in which study and work placement alternate.[3] Comparative information on schools of architecture like the European Association of Architectural Education EAAE web-guide mainly offers a general impression.[4] By mapping the curricula visually and comparatively based on written data we hope to provide a method to get a more in depth and systematic understanding of the didactics of schools of architecture. Hopefully this data based research creates an awareness that provides a background for qualitative matters like courses and teachers – in my view the most important decisive parameters concerning education.

*** A comparison of The Netherlands: TU-Delft, TU-Eindhoven; Switzerland: ETH- Zürich; Belgium: KU-Leuven; Germany: TU-Berlin; Denmark: Aalborg-University; Italy: Roma 3; Spain: ETSAM Madrid; Portugal: University of Coimbra.[1]**

1. C.N Ledoux, the auditorium of the theatre in Besancon reflected in the eye, 1800.



1. The map shows the number of BSc students (full colour) and the number of MSc students (no fill) registered in 2012. Drawing Jurgen Beliën.

The aim of this survey is not about evaluating or judging curricula, but about knowing how faculties have structured education in architecture and architectural design. A methodology to map the education in Architecture could open a platform and network.

Which are the generalities and particularities, the similarities and differences of BSc curricula in Architecture?

Which is the main content of the curricula? What is the main structure of the study programme? Which are the main didactical principles structuring the programme?

Special attention is given to the content, structure and organisation of design education.

For this comparison principles were mainly interpreted from practice. Data were collected from a specially developed questionnaire, course-descriptions, visitation reports and interviews with acquaintance teachers and international students studying in Delft.[5]

The selection of schools of architecture involved in this comparison was based primary on the criteria of a fulltime academic Bachelor and Master of Science programme. A wish was to look over Europe broadly, from Rome to our close neighbours Eindhoven, Gent/Leuven. ETH Zürich is Delft's natural peer faculty concerning many characteristics like size and a mainframe of a university of technology. Last characteristic relates Delft to TU-Berlin and ETSAM Madrid. Aalborg University from Denmark was chosen because of their successful tradition in didactics of 'problem based learning'. ETSAM Madrid and Coimbra University are the only academic architecture educations in this survey which are a single nonstop Master of Architecture training without a clear BSc MSc separation.[6] In both cases the last year is a final proof of capability which is interpreted as a MSc and so not included in this survey.

Content

The BSc study programmes are mapped by joining ECTS credits in seven fields[7]: I. elementary beta-science, II. alpha and gamma-science, III. form and visualization, IV. theory and design methods of architecture and urbanism, V. theory and practice of building technology, VI. real estate, VII. design.[8]

Circle diagrams show the number of ECTS proportionally on the sides, as a result of which differences are strengthened. Steps in fading grayscale represent three (to five) study years starting from the centre. What cannot be read from the diagrams is amassing knowledge integrated in the design education.

The visual overview clearly shows remarkable similarities and differences concerning ECTS clusters.

A striking similarity is the substantial part of ECTS (average 30% of the study programme) dedicated to design education, with the exception for Leuven where fundamental beta-science is a core. Intense training in the field structural engineering is specific to the

Belgium architects training system. In the case of Leuven a theoretical approach in general can be noticed from the vast number of theory and the meagre quantity of 'design' and 'form and visualisation' courses.

A second similarity is the field of building technology as a main point (average 20% of the study programme), in which Delft and Aalborg score relatively low.

Delft is unique for a full spectrum of fields distributed evenly. A unique situation in the Delft curriculum is the number of ECTS in the field of Real Estate and Housing, which is a MSc specialisation. Delft offers only one wide BSc programme giving access to only two Delft MSc tracks with many specialisations in fields, issues and approaches.[9] Eindhoven is oriented towards building practise by tradition. At this faculty the choice for a specialisation has to be made by the student after one year BSc programme already.[10] Coimbra and Madrid offer only one education programme training just architects. [11]

Aalborg, Madrid and Coimbra have a stress on 'form and visualisation'. In the case of Madrid a focus on the training of drawing skills is in the first year. In Zürich form and visualisation is a rather small course in the first year and after that embedded in the design project. The education in architecture and urbanism in Aalborg used to be linked with industrial design until recently, and, have an advanced Computer Aided Design specialism which is more oriented on general engineering than architecture specific. Coimbra focuses on the craft of traditional drawing by hand, which is a deeply rooted in the Portuguese architectural culture.[12] In Coimbra humanities stand out which might be explained by the broad range of sciences the university covers.

Structure

Ordering the ECTS per clusters in a line-graphic exposes other principles.

A tendency is a yearly climbing number of ECTS for design, which is to be interpreted as 'theory before practise'. Some schools have a yearly point of gravity: form and visualisation in year 1 (Madrid, Aalborg) ; building construction in year 2 (Berlin, Zürich); theory in year 2 (Aalborg); design project in year 3 (Berlin).

A minor in BSc5 is an obligatory free choice for students all over the Dutch Universities.

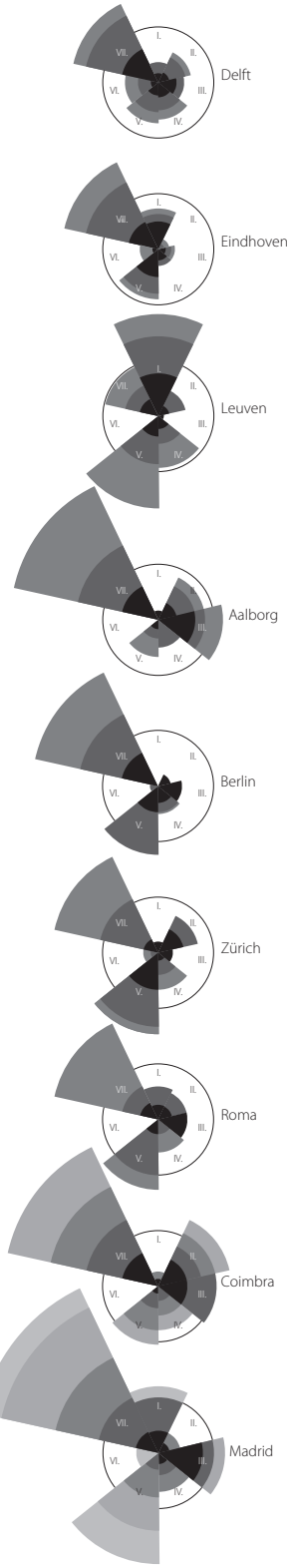
Scheme

Ordering the ECTS clusters per semester provides an overview of:

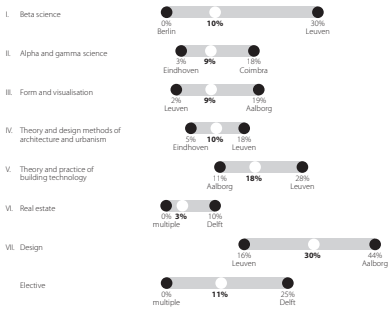
1. Study programmes structured in periods of years (Coimbra), semesters (Leuven, Zürich, Berlin, Rome, Madrid), quarters (Delft, Aalborg), or a combination of quarters and semesters (Eindhoven).

2. A system of parallel courses, alternating courses or following courses.

Delft and Rome alternate design projects and other courses but in a different cycle respectively quarterly and per semester. ECTS credits are alike, so, hatching time is different. Delft has chosen this schedule to



2. ECTS Cluster pie chart diagramme. Drawing Jurgen Beliën.



3. Average ECTS clusters curriculum. Drawing Jurgen Beliën.

avoid competing workloads by shifting design projects from 'knowledge courses'. Aalborg shows the closest connection between acquiring knowledge followed by practising. Interlocking relationships are explained in the course materials in detail.

3. The number of courses a student is following at a time. Usually the first semester of a curriculum has got more courses than later on. It seems some faculties have a policy for concentration into larger units: in Rome students always follow three courses simultaneously (minimum 4-8-12 ECTS). Delft is preparing a block plan schedule in which all courses are following (maximum two parallel) for the upcoming study year (5 or 10 ECTS) replacing a situation of 2 ECTS fragments and trying to avoid duplication.

Note: elective courses are not included in this graphic.

Profiles BSc curriculum

Principles guiding the content of a curriculum are already mentioned. Firstly, the master tracks which they are preparing for; secondly, the institution which they belong to and their faculty traditions. A third and very important factor is the kind of graduates the school aims to train: 'generalist engineers' or 'specific architects'. A distinction between 'reality practise based' and 'academic theory based' is a completing parameter here. Profiles can be deduced from the course programme and the kind of design assignments students are working on . Engineering orientated schools focus on the development of design competences while architectural design orientated schools architectural problem are at the centre.

Table 1 Overview profiles

Academic engineering	Leuven
Practical engineering	Eindhoven, Aalborg
Practical architectural design	Delft, Rome, Zürich, Berlin, Madrid
Academic architectural design	Coimbra (craft), Leuven (theory)

Models for education

To describe the didactical principles for design education in the curricula, multiple issues are of importance.

First is the approach to how a student should educate and be trained. Some schools offer a full laid down BSc programme for all students similarly (Delft, Zürich, Coimbra, Aalborg), while others offer a wide choice of courses and studios already from the beginning onward wherein students should find their own way (Berlin). Here Eindhoven offers an interesting built-in coaching system in which students have to substantiate every upcoming choice of courses.[13] Freedom for teachers to develop courses themselves, or, an obligation to carry

out a centrally directed programme is in this field too, indicating a glimpse of the view on academic atmosphere.[14]

The approach according to which students are responsible for their own development, that they should discover oneself according to a 'problem based learning' model (Aalborg, Delft more or less) is opposite to the 'master-mate' model in which teachers tell students what, why and how to do (Coimbra, Zürich). All design projects in Aalborg are team work for didactical reasons of stimulating students to be self-reliance, substantiate and reflective.

The scale of education at Madrid is so large that 'survival of the fittest' can be regarded as a didactical principle.[15]

A second issue is the content of design projects. Schools of architecture share most regarding to studio design assignments. Average size of a design project is 10-12 ECTS (6 minimum, 16 maximum). Every school has a climbing structure from 'small and simple' to 'larger and complex'. Usually BSc5 holds an experimental character. In The Netherlands BSc5 is a minor by ministerial decree.[16]

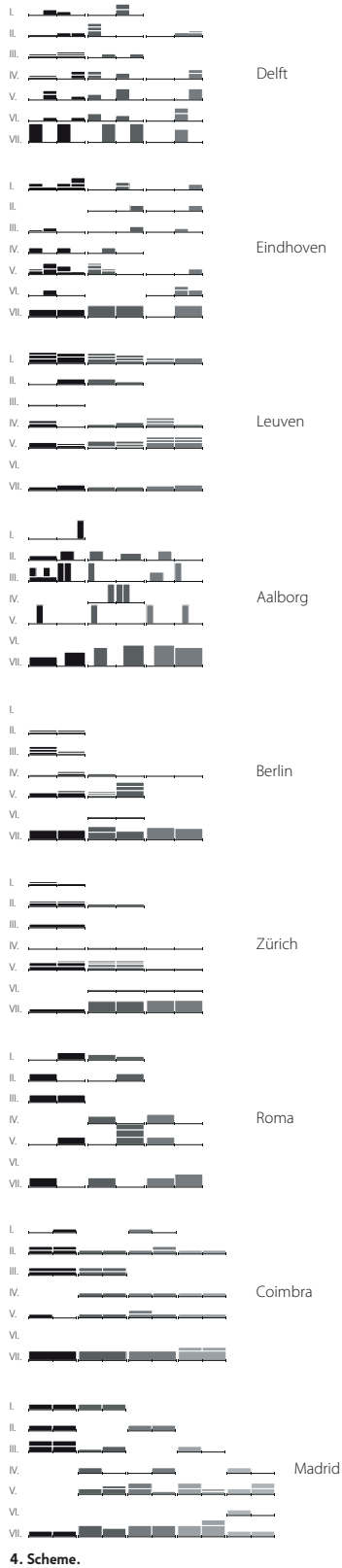
Matters of design usually are: House and landscape; Simple public building with a large span; Housing in the city centre or periphery; complex multifunctional cultural building.

Project locations usually are in or nearby the city that is the home base for the university. Local specialties are incorporated, like the scale of a project, attention to landscape (Coimbra, Delft) and urban conditions (Rome, Zürich). Only Berlin includes foreign design locations explicitly in the third year. Actuality usually is not a big topic in BSc design projects, most assignments are about 'classics' like already mentioned above.

Structure of design projects is a third issue to consider. Most common structure for the series of design projects is a first year about designing and notions, a second year about dimensions of a design, and a third year focusing on integration and representation. Domains from architecture, building technology and urbanism pass in review.[17]

The curricula differ slightly concerning the parameters by which the series is built up.

Delft has a structure of alternating domains and focus (architecture and landscape context, building construction, urbanism, housing, real estate and planning, architecture and building technology). The upcoming agenda is how to offer a programme which is experienced as useful for all specializations, from architecture to real estate. In Delft 'dimensions' play a role already from the start. Eindhoven develops from overview to specialization to an interdisciplinary project named atelier work/project work/ multidisciplinary design. Zürich and Leuven climb from basic concepts to Integration of dimensions/domains and, position and methodology (last which in Delft is a master topic). Berlin climbs from 'architecture and building technology' to 'design'. Zürich and Berlin have 'vertical studios' in which BSc and MSc students participate as junior and senior students. Aalborg repeats Form + Technique +



4. Scheme.

Process six times. In the first two projects the stress is on designing, followed by three thematic projects (dwelling, urban architecture, working space) and closed by an integrated design project. An often used educative principle (which is not used in Delft) are assignments to improve or finish draft versions of a design.

Madrid starts from a series of academic basics: 'Idea and argumentation', 'reflection and elaboration', 'critical thinking'; this is followed by a series of programme related projects. Coimbra starts with understanding space, then introduces urban space and the role of architecture in urban assignments, then the architectural program (social and cultural facilities, housing and a big program or 'Grand composition' finally introduces urban design up to the scale of a landscape).

Concerning a didactical plan Aalborg is most extensively and systematically: every aim is written out; divided in competences, themes, methods work forms, examination forms.

Contrary is the situation in Leuven where the aims are brief, and no more than a location, a programme and the level of elaboration are specified. At faculties where teachers develop education programmes within studios themselves (Zürich, Berlin, Rome) teaching is usually directed by 'problems' and 'methods' rather than general 'competences' and 'process'.

Design projects are approached analytically at every university, but, with different meanings or frames. In Delft for the BSc design curriculum we have a long lasting tradition in which design projects are always accompanied by studying precedents from several perspectives (plan analysis). The Coimbra school puts efforts in form study and analysing the visual qualities of them.

Whereas Coimbra is very good at 'in depth working through from a specific position of craftsmanship' the BSc-programme of the very large school in Delft aims at 'a more rational awareness of different positions' which is different culture. Our schools share the 'adaptive'; that architectural design is about a precise dialogue and relationship. The notions on power of visualization and the idea that knowledge is in buildings is a strong quality of Coimbra.

Table 2 Organizational principles of design studios.

	Number of Students per studio	Number of Teachers per studio	Competences teachers	Group division	Average contact hours per week
Delft NOW	9/18	1/2	practising architects	assigned by faculty	2x4 / 2x8
Delft FUTURE	20	2	practising architects + academic architects	students sign up	2x8
Eindhoven	16	1	professors	assigned by faculty	16
Leuven	24	1	architects	assigned by faculty	2x4
Berlin	20>10	1	professors	students sign up	8
Zürich	30	3	Prestigious publishing/ published architects	students sign up, priority regulations	16
Aalborg	30/40	2/3	coordinated phd students	assigned by faculty	2
Madrid	30/50/70	1	academic architect, (prestigious Spanish Architects)	students sign up	3
Rome 3	70	4	team professor, assistant professors, PHD candidates	assigned by faculty	2x4
Coimbra	4x20	4	professors + invited architects	assigned by grades	10

1 → Thanks to Jurgen Beliën, who collected the information about the schools of architecture.
2 → In the Netherlands only 20 % of the university grade students in technology succeeds to obtain the diploma for the three years BSc in four years' time. The situation at our faculty is even worse: 17%. The aim is to improve this percentage up to 70%.
3 → As formulated in the conference introduction on the Portuguese situation.
4 → http://www.eaae.be/members_new.php
5 → Questionnaire is available for schools which would like to join in the project.
6 → This connection Delft-Coimbra is established by Nelson Mota who is a Portuguese PHD-researcher based in Delft and Coimbra. He introduced me to Gonçalo Canto Moniz and Paulo Providência who visited the Netherlands during an excursion to the Netherlands in June 2010.
7 → ECTS = European Credit Transfer System, 1 ECTS = 28 study hours.
8 → 1. elementary beta-science = mathematics, physics, materials 2. alpha and gamma-science= history, humanities 3. form and visualization, 4.theory and design methods of architecture and urbanism, 5. theory and practice of building technology, 6. Real estate= practise, business, law, economy, 7. Design.

9 → The Delft BSc programme gives access to a MSc Architecture and the built environment and a MSc Geomatics. Specializations concern fields of architecture, urbanism & planning, building technology, real estate and housing; topics and approaches are studio related. BSc graduated students from Delft and Eindhoven are allowed to continue MSc education changing universities. International students have to pass a selection procedure.

10 → The Eindhoven BSc programme consists of tracks in M&S= management and urbanism, S&A= urbanism and architecture, A&T= architecture and technology, T&M= technology and management.

11 → Unconditional continuation BSc > MSc within institution :
Delft: 1. Architecture, Urbanism and Building Sciences (Architecture (85%)/ Building Technology/Urbanism/Real Estate/landscape; 2. Geomatics; Eindhoven: 1. Architecture, Urbanism and planning, 2. Building Sciences, 3. Construction management and engineering; Leuven: 1. Engineer architecture (architectural project/ urban project/ building technology design); Zürich: 1. Architecture2. Spatial Development and Infrastructure Systems; Berlin: 1. Architecture, 2. Architecture and durability, 3. Real Estate and housing/developing, 4. Design, structure, energy; Aalborg: 1. Architecture, 2. Urbanism, (3. Industrial Design); Rome: 1. Architecture, 2. Town Planning, 3. Restoration; Madrid: 1. Architecture; Coimbra: 1. Architecture.

12 → As for instance to be noticed from the lecture this conference by Alexandre Alves Costa.

13 → After the first year one choses a specialisation, after the second year a minor-semester, after the third year a master track. This reflective report is a 1 ECTS compulsory course.

14 → At Roma 3 the freedom of teaching is constitutionalised.

15 → It might explain the large number of students.

16 → A minor is a full semester programme from any university in the Netherlands or abroad.

17 → Domains = Architecture, Urbanism, Construction, Engineering, Real Estate. Dimensions = context, building mass, programme, space, materialization, décor.