

DAVID AND GOLIATH CROSSING THE BRIDGE

Henri CHRISTIAANS¹ and Rita Assoreira ALMENDRA²

¹ School of Industrial Design Engineering, Delft University of Technology

² Faculty of Architecture, Technical University of Lisbon

ABSTRACT

This paper presents the comparison of two different Design Education institutions regarding: a) the existence, weight and role of research disciplines in the Design program; b) the theme and nature of master thesis and PhD dissertations; and c) the role companies and industry in general play in driving and/or being driven by the research developed at those Design Programs.

The analysis is twofold and comprehends:

1) A micro level where a synthesis of the major discrepancies between the two institutions has been made. The different parameters to be observed and scrutinized are: the curricula, the horizontal and vertical integration of the disciplines (bachelor to PhD courses), the link of the courses with internal and external research units and the collaboration between students and companies in general.

2) A macro level addressing the context. It includes various variables such as the background of each institution and some external variables that play a key role in the way design, research, education and economical agents (companies) perceive their roles and interact. They are: the country policy/attitudes towards design and research; the degree of maturity in using design on the part of the companies; the awareness and perception the country's design has worldwide.

Being a descriptive study it is mainly based on literature, facts and figures. However, an experiment done with students from both countries collaborating with and within a company will be presented in order to illustrate the key issues addressed in this paper.

Keywords: Bridging education and industry, research role in education and industries, Dutch and Portuguese design education

1 INTRODUCTION

Bridging design education and business/industry is a challenge that in the last 15 years makes part of the Design agenda of most of the developed countries. Several studies have been conducted (Design Council 2003, 2005, 2007, 2008, 2009, Designium, UIAH 2003,2005, KIDP, 2008) that identified and proposed plans to make this relationship more effective and rewarding for both design education institutions and industry/firms.

Regarding the vision of business towards the role of design Sands and Worthington [1] acknowledge that:

“Demand for design is growing but it is also changing. Up to now, the perception of design has been connected mainly to delivering products, packaging, graphics and logos. Increasingly, however, companies are now looking to designers to deliver innovation established brands and improve systems. They are using designers more strategically across their businesses to help them grow and compete more successfully in global markets. Further transformation of the market for design is emerging in areas such as public services, where designers are working with users to create services that are more flexible and efficient, and in response to critical environmental issues, with sustainable solutions being designed into new products and services.” (2007, pp.4-5).

With this changing role of design and the designer education and research at our institutions should at least adapt to it or play the role of a pioneer anticipating on the future. As Hytönen [2] claims in the report about the *quality and content of International Design Education*: “The current international development indicate that of design education and research lies in concentrating resources into large units that have broad coverage and tight focus on specialization (...). The development of high-quality design education and research requires effective co-operation with the business sector, the best

domestic and international universities and research institutions, and also the creation of a network for development activities.” (2003, p. 24)

Therefore, it is useful to identify and analyse what is being done taking as an example a reference university responsible for the design education in Europe in a large scale and a small one where design education has a 15 years history and a totally different approach.

2 DESIGN EDUCATION AT TU LISBON AND TU DELFT

2.1 Bachelors, Master and PhD courses

In 2007 the Design programs at the Technical University Lisbon (UTL) in Portugal were restructured according to the Bologna declaration. The transformation was deep since before this change the Design programs had 6 years (5 +1 internship) and the masters had 2 years. In this previous programs the weight of theoretical and social sciences was stronger than in the actual ones. Nevertheless, it remained divided into the traditional design areas of product design, communication design and fashion design, each with their own master programme.

Design Education at UTL’s department of Art and Design of the faculty of Architecture (FA.UTL), is ruled by a ‘proximity culture’ since it accounts for an average of 30 students per year in the bachelor, 20 students in each master and in total 145 PhD students. Classes are taught in Portuguese. The students are mainly Portuguese but in the last 10 years due to the mobility programs such as ERASMUS, there is also a presence of foreign students (before in the 4th year of the program now in the 1st semester of the 1st year of the master) coming from schools in Europe (mostly Italians, Dutch, English, Eastern European) and in Brazil. The Portuguese students also go abroad within ERASMUS (15 in total; 2 per year with Delft) during 6 months and some during 1 year.

This mobility allows confronting FA performance with other design institutions. FA students have, in general, a very good performance abroad partly due to the fact that they have been selected by FA.UTL. Their integration in the program after that experience in other schools benefits the peers and stimulates learning.

The Faculty of Industrial Design Engineering of Delft University of Technology (FIDE.TUD) in the Netherlands on the other hand is the largest Design Education institution in the world with about 380 freshmen per year in the bachelor and more than 300 students per year starting in the masters. The number of PHD’s is around 70. In response to the Bologna declaration, the TU Delft introduced the Bachelor-Master degree system in 2002. It has a curriculum model of a three years bachelor programme and a two-years master programme. The language in the bachelor is Dutch while the three master programmes are in English. Therefore, in the masters it has a tradition of a multicultural student population coming from all over the world since the number of foreign students has increased to 78 in 2009. Moreover, the number of exchange student is increasing, from 30 in 2005 to 55 in 2009. Since 2005 TU Delft has a stable number of 2 Lisbon exchange students per year.

TU Delft has joint Master programmes with METU, Turkey and KAIST, South Korea.

In Table 1 the content of all different programmes is translated into percentages spent to one of three areas: (1) specific for that programme (including technology, materials, drawing), (2) human/social theory, and (3) business.

Table 1. Bachelors, Masters and PhD at the two Faculties

PROGRAMS	Faculty of Architecture - TU Lisbon				Faculty of Industrial Design Engineering - TU.Delft			
	BRANCH OF DESIGN	STRUCTURE OF CURRICULA			BRANCH OF DESIGN	STRUCTURE OF CURRICULA		
		SPECIFIC (includes technologies, materials, drawing)	HUMAN/SOCIAL/THEORY	BUSINESS		SPECIFIC	HUMAN/SOCIAL/THEORY	BUSINESS
BACHELOR (3 years)	DESIGN average of 30 students/year	70%	17%	13%	IDE average of 100 students/year	70%	15%	15%
	FASHION DESIGN average of 30 students/year	81%	9%	10%				

	Faculty of Architecture - TU Lisbon				Faculty of Industrial Design Engineering - TU.Delft			
MASTER (2years - 1 for dissertation)	PRODUCT DESIGN average of 20 students/year	71%	19%	10%	INTEGRATED PRODUCT DESIGN average of 100 students/year	80%	10%	10%
	COMMUNICATION DESIGN average of 20 students/year	75%	11%	14%	DESIGN FOR INTERACTION average of 100 students/year	65%	30%	5%
	FASHION DESIGN average of 20 students/year	75%	11%	14%	STRATEGIC PRODUCT DESIGN average of 100 students/year	10%	30%	60%
PHD (at least 3 years) - 145 students since 2006	DESIGN (1 curricular year) * the remaining 17% can be done in optional courses from all types 145 students since 2006	25%	58%		DESIGN (no curricular year. Courses are optional up to 15%)	-	-	-

At first face there are no big differences between the programmes except for the Masters in Delft. However, the bachelor in FA.UTL had changed its curricula reducing the weigh of human/social theory courses, reinforcing the domain-specific knowledge area as well as the business one. Also to notice that the master's programmes are assumed differently. At FA.UTL they are a 'natural' extent of the bachelor course and do maintain a broaden approach to Design while at FIDE.TUD there is a concrete specialization in design fields that have a key importance to the markets/business.

Research as part of the design education curriculum in the two Institutions has quite a different weight. In the new programs FA.UTL only an optional course on design research exists (3 hours per week/42 semester) offered to the three masters. Furthermore, the second year of the masters is dedicated to research related disciplines along the first semester. The PhD program is research oriented and the predominant courses support the execution of philosophical/theoretical thesis.

Regarding the attention given to research in education, both bachelor and master programmes have compulsory courses on this topic. Two of the masters, Design for Interaction and Strategic Product Design has a clear research focus as expressed in the number of courses on this area. Delft doesn't give compulsory courses to PHD students, contrary to Lisbon. PHD's can choose their own courses. Table 2 gives an overview of numbers, themes and nature/focus of both master dissertations and PHD theses at FA.UTL and FIDE.TUD.

Table 2. Master Dissertations and PhD Theses at both Institutions

Themes Focus	FA. TU. Lisbon							TU.Delft				FA. TU.Lisbon	TU.Delft
	TOTAL	PRODUCT 21	COMMUNICATION 29	FASHION 12	INTERIOR 8	PUBLIC SPACES 2	TOTAL	INTEGRATED PRODUCT DESIGN	DESIGN FOR INTERACTION	STRATEGIC PRODUCT DESIGN	PHD THESIS (in progress) (64 of 143 have theme defined)	PHD THESIS	
Historical	12	0	7	4	1	0	0				9		
Theoretical	18	8	7	2	1	0	0				10	1	
Object Analysis	5	3	0	2	0	0	450	356	78	16	5	5	
Case Study	4	1	3	0	0	0	5	2	1	2	5	2	
Author/ Designer	2	0	1	0	1	0	2	2			1		
Inclusive	10	2	3	1	3	1	60	31	24	5	4	5	
Sustainable	1	1	0		0	0	79	50	7	22	9	7	
Management	8	4	3	1		0	96	2	2	92	4	4	
Interaction	5	1	2	1	1	0	62	10	49	3	2	5	
Innovation	1	0	0	0	0	1	36	2	1	33	4		
Cognition	4	1	1	1	1	0	49	7	29	13	3	20	
Research	0	0	0	0	0	0	28	8	12	8	1	*	
Methods	0	0	0	0	0	0	65	10	17	38	1	17	
System Analysis	2	0	2	0	0	0	3	2	1		6	3	

The FA.UTL masters and PhD students show clearly an attraction to theoretical and historical approaches topics. Particularly in the PHD projects two lines of research are emerging: the inclusive and the sustainable. Looking at the Portuguese industry's maturity one can observe that the areas being more intensively studied at FA.UTL have a hard time to be immediately accepted by companies. They are clearly more tuned to the innovation and management areas. However, it is also the goal of research to anticipate the 'world needs' and to propose ways of better assessing problems and actions. FIDE.TUD shows another picture. Apart from the huge amount of master dissertations (935 in the period 2005-2009), the focus on designing objects is outstanding (48%). Other important topics such as management and sustainability are following at great distance. The differences in focus between the three masters are according to what they promise: interaction, cognition (emotion, perception) and inclusive design are clearly linked to Design for Interaction, while management and innovation are typical subjects for Strategic Product Design. As we see later on, most of the projects stem from industry itself and apparently are the relevant topics of that period. For the Delft PHD's cognition and methods are the two topics mostly studied.

2.2 Bridges between Education and Industry/Business

To address the relationship between design education and industry/business is to consider the context of it, i.e. the design role at national level, the firm's degree of maturity in design's use and the country's design policies. The role of design at a national level is crucial to the definition and strength of the relationship between education and industry. There exists some information compiled in rankings, but the 2009 report made by Moultrie and Livesey [3] makes a rigorous assessment of this topic by means of collecting and comparing data on key indicators of design to define national capabilities. That type of studies, we believe, are essential to support a systematic approach to this issue. The analysis includes the study of: a) enabling conditions such as including national policies, strategies, institutions and endowments; promotion through programmes that promote design to both business, particularly small and medium sized firms, and the general public; b) inputs/ capabilities: the development of human capital relating to design, including design graduates, designers in the workforce and those working in the design sector; c) outputs: intellectual capital generated as a result of design activity, including design registrations, trademarks and receipt of design awards; d) outcomes: reflecting the impact of the output on the overall economy (2009, p.16). It is interesting to notice that although TUDelft is a reference worldwide in design education (serves as an example to several studies such as the ones of Designium and of Design Council [4]) the Netherlands does not appear in the top of the Design competitive level rankings. That has probably to do with the lack of a national policy and of a consistent and regular study of the relationship between design investment and design outcomes in terms of the economy.

TU Delft education's success in the area of design is clearly related with the effective and consistent relationship it has with industry and service companies. That relationship is part of its distinctiveness and it rules the way programs are structured as well as the research units establish their lines of research. In Table 3 differences between Delft and Portugal regarding internal and external factors are presented.

Table 3. Comparison of the 2 education systems and context

	Internal Factors	External Factors			
Schools	Background	Country design policy	Degree of maturity in the use of design* (design ladder)	Global Awareness of the design in the country (rankings)	Attitudes towards design and research
TU Delft	Engineering/ expert approach	Design as a strategic resource	Medium High in the majority of the companies	'Dutch Design' is a player in the business and academic world	Companies and education have a consistent and natural relationship and it is assumed as a win-win situation
FA TU Lisbon	Arts/ Humanistic approach	Design is part of the innovation strategy in a very diffuse way	Low - most of the companies use design as styling	There is no awareness of a 'Portuguese design' although there are several Portuguese designers contributing to the 'good design' all over the world	Education understands and tries to establish the bridges; companies do not have that culture of collaboration; the links occur not in regular basis

*The design ladder is a useful 4-step model for grouping companies' design maturity on the basis of their attitudes towards design. The higher a company is up the ladder, the greater strategic importance design has for the company.

In contrast, FA.UTL has not an established relationship with industries. It does it in an episodic way, in the past in the last two years of the 5 years course and with the new programmes in the first year of the master. The design studio teacher is the person who might establish contact with a firm, either with a real design brief or with a fictional one. The company would appear at the beginning of the process and at the end it would participate in the evaluation of the outcomes. Students also have contact with firms in the way that they participate at least in one contest per year (in the last years) launched by a firm that is integrated in the design studio program.

3 AN EXPERIMENT WITH DUTCH AND PORTUGUESE STUDENTS INSIDE A FIRM

An experiment was done with 4 groups of students, two from Delft and two from Lisbon (each with 4 elements). All the students were finishing their master course in Product Design.

The experiment was located inside a company CIMP that develops Branding strategies and promotion and merchandising products to other firms. The company operates in Portugal, Spain and Brazil. The office in Portugal had 60 employees (10 integrated in the Creative and Design department). Furthermore, they had a production centre where it is possible to produce some sort of products (depending on the materials and the type of technology).

The challenge for the teams was to find a solution for the brief given by the company (see Figure 1). The time available was one week (from 29 June until 3 of July). The students had to develop their work inside the company having a specific space for each team. They had full access to the Creative and Design department and also to the production one. The last day they had to present their solution to a jury (integrating four elements from the company) and the winning design would have the possibility of being produced.

Design Brief Goals
1. Development of the new Brand CIMP that includes its logo and the due Use Norms Manual. The new Brand and its logo must present references to the previous one so it will become visible that the Brand is evolving but has a Past. 2. Create a more dynamic and personalized ambience in the headquarters of CIMP Portugal that is considered very static. This ambience must transmit very accurately the new image of the company.
Work to be developed and to integrate the proposal
1. Logo and the User's Norms Manual 2. Reception Design : Design of the space of the firm's reception with a special focus to the attendance counter and the awaiting area. 3. Signs Design : Functional and Informational 4. Display of CIMP's Communication Projects : a display to be placed in the corridors and other areas that serves to expose photos or images of CIMP's projects. The easiness of use regarding the replacement of images is to be considered.
The proposal must be printed (to be presented to the Jury) and a presentation of 15 minutes will be made in 3 July at 15.00 in the Faculty of Architecture; The proposal must include a scaled model of the counter or the display.

Figure 1. Excerpt of the Brief (CIMP, 2009)

3.1 Method

Two teams were videotaped and the other two were audiotaped. Furthermore a master assistant student (on the part of the researchers) stayed all the week in the company to guarantee the operational aspects of the experiment as well as to mediate (if necessary) in some practical aspects of the relationship between the students and the company (see also Figure 3).

The evaluation of the outcomes was done using criteria previously accorded and defined between the researchers and the company representatives. The criteria were: a) Creativity, b) Quality of the communicative interaction, c) Strategic adequacy, and d) Overall quality. Table 5 presents data about the teams and their outcomes.

Table 4. CIMP Experiment - methods and evaluation

Teams: D -dutch/ P -ortuguese)	Method	Jury Evaluation average 0-20 scale	Ranking
D1	VIDEO	13,5	3
D2	AUDIO	13	4
P1	VIDEO	14	2
P2	AUDIO	17	1

Recorded data was analysed according to *Critical Incident Analysis* method. Each tape (both video and audio) was reviewed and the critical moments in the process were tagged and interpreted. The parameters of this analysis integrate a proposed decision making model to support the improvement of the design process' outcomes regarding its strategic adequacy and overall quality.

The parameters used in the analysis are: a) Design strategy (problem; solution; integration driven); b) The Type of decision (Framing; Key; Enabler); c) the mode of decision in terms of team dynamics (autocratic; cooperative; autonomic); the decision strategy (compensatory rule based; non compensatory ruled based and negotiated).

3.2 Summary of the results of the experiment:

- The more humanistic nature of the Portuguese Design Programs, including Communication Design seems to ensure a better solution to the company when compared with the Dutch Design student's performance, who were more product engineering focused.
- Dutch teams took significant more time trying to define the concept than Portuguese ones. They also made explicit use of several creativity supporting tools and methods that were absent from the Portuguese team's process.
- The Portuguese teams made an intense use of different drawing/modelling software programs and explored keenly the presentation aspects of the solution.
- Portuguese teams also defined earlier in the process a strategy of dividing tasks; the role of the leader as well as the autonomic mode of group dynamics along the process was clearly defined.



Figure 2. Aspects of the one week experiment done with Dutch and Portuguese Design students inside the company CIMP (Portugal)

4 CONCLUSIONS

The development of design education and research requires effective co-operation with the business sector, but until now this is not common practice among most European design schools. In order to get inside in this practice we decided to make a case study, including an experiment, by comparing two different design schools, one at the Technical University Lisbon (FA.UTL) and one at Delft University of Technology (FIDE.TUD). The schools are very different regarding philosophy and their view on the role of design. Looking at the results of our analysis the following conclusions can be made.

The chain Education-Research-Industry is far more consolidated at FIDE.TUD, a larger, older and engineered based design education institution. At FA.UTL, that has design programs since '85, a reduced number of students and a humanistic approach to Design Education, the chain Education-Research-Industry is now being approached by stabilizing a consistent relationship between education and research that hopefully will make possible a strengthening of the connections to Industry.

The experiment with students from both institutions made clear that the difference between them was reflected in the process approach and in the design outcome.

Important is also to be aware of the relevance of the degree of maturity in design usage by the national industries of both countries, those in the Netherlands being much more aware of the innovative power of design. That maturity determines somehow the type and depth of relations to be established.

The existence of Design National Policies and the establishment of Research National/International Programs to encourage the reinforcement of the relationship among these three players are also decisive.

REFERENCES

- [1] Sands, J. and Worthington, D. High Level Skills for Higher Value, *Design Council and Creative & Cultural Skills*, 2007, pp. 1-72
- [2] Hytönen, J. Quality and Content of International Design Education. *DESIGNIUM, the New Centre of Innovation in Design*, 2003, University of Art and Design Helsinki, pp. 1-36 Available at <http://www.uiah.fi/designium>
- [3] Moultrie, J. and Livesey, F. International Design Scoreboard: Initial indicators of international design capabilities, 2009, University of Cambridge, Design Council, pp.1-92
- [4] Lessons from Europe .Report on the Design Council/HEFCE fact-finding. Visit to The Netherlands, Denmark and Finland. 5-10 September 2007, pp.1-16.