HOW DESIGNERS USE THE WEB IN TEACHING
A Case Study

Ilpo Koskinen
School of Design, University of Art and Design Helisnki

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Abstract: This paper looks at how experienced design teachers use the Web in teaching students in studio environment in the Bauhaus tradition. It develops a framework for understanding possible functions of the Web over the design process, and examines Web use practices in one of Europe's largest design programs, situated in Helsinki. In the absence of department policy, instructors have developed various ways to integrate the Web to teaching. In particular, the Web is used at the more industrial end of education, reflecting changes in design over the last few decades.

1 FROM STUDIO TO THE WEB

Teaching designers at universities largely takes its cue from traditional crafts enriched with a dash of art following principles crystallized in Bauhaus. Essential to teaching is that it takes place in the studio rather than the classroom (Blashki 2002; Hummels & Frens 2008). This paper is a case study of how designers have integrated the Web to teaching in one of Europe's largest design programs.

With the exception of classes in philosophy, art history, and computer science, in which learning is based on models stemming from the mother disciplines, in such traditional design disciplines as ceramics and furniture design, knowledge is transmitted from one generation to the next mostly using a traditional master-apprentice model. A typical design class begins with an intensive classroom period, and continues through concept design to prototyping, which is done in studios. Throughout, crucial to the success to this creative, constructivist, and multi-sensorial process is a close connection between teachers and students.

However, even though the basis of design education has not changed much over the last 70 years, globalizing economy and changes in student population have brought about a few changes. In particular, design education stresses multidisciplinary teamwork, multiculturalism, new technology, and research. Most design tasks today are "wicked" (Rittel and Webber 1984) and require a multidisciplinary team. Multiculturalism is based on two trends: the increasingly global nature of academic teaching, and to the fact that globalizing economy requires people who are able to negotiate their way through multiple cultures. Designers have been in the forefront in adapting new technologies to their work, and new working methods such as user studies and system analysis are a routine part of design (see Valtonen 2007).

For many reasons, then, intensive communication is at the heart of the educational process. It is necessary for success in master-apprentice relationship, but also in today's complex teamwork processes. Obviously, it is also at the heart of many other processes, including the key process of socialization into the design profession, reflection (Schön 1983), and the creation of dialogue necessary for creating and maintaining a community of practice (Lave and Wenger 1991; Fischer et al. 2007; Stahl & Hesse 2006). On one hand, design education has many "affordances" – like communication – that favor adopting the Web; on the other, it has many affordances – like multi-sensoriality – that work against the Web (for affordances in design, see Norman 1998).

How, then, is the Web integrated to this environment? This paper analyzes design education in one of Europe's leading design schools, and looks at how the Web is actually used in the classroom to support education. Specifically, it probes two questions: (1) how experienced design teachers use the Web in their work; and (2) what explains these variations. However, this paper focuses on

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traditional designers, who build chairs, spaces, products, and interactive systems, not media designers or software engineers. This paper focuses on designers trained in art rather than technology.

2 INTEGRATING THE WEB INTO DESIGN PROCESSES

Despite changes described above, design pedagogy still largely follows traditional master-apprenticeship model. In preparing for classes, teachers typically construct the design task often with companies, organize funding, materials, find and schedule expert lecturers, book studio and machine time, and organize access to possible equipment outside university studios from universities' outside networks. From the student standpoint, a typical design class starts with an introduction, which consists of lectures, readings, and other knowledge content that guide students to the topic of the class (i.e. issues like sustainability or banking services). This phase typically takes place in the classroom. This phase is followed by the design phase, which consists of:

- *Concept design*: students create concepts, often through a user-centered process. This typically takes place in meeting rooms and open spaces with a lot of wall space that becomes a knowledge environment (Nugent et al. 2008).
- *Studio phase*: often called prototyping, the focus is next on constructing the ideas. This typically takes place in studios and workshops.
- *Presentations*. During the class, there are gates for feedback, and at the end of the class is critique. Students typically prepare presentations of their work and rehearse pitching their ideas in front of the teachers, fellow students, and sometimes also experts who come from the outside.

After the class, disseminating design work usually borrows its methods from art and industry rather than science. Thus, its main "centers of coordination" (Latour 1990) are not only articles and books, but also exhibitions and expos. With fashion schools leading the trend, design work is increasingly exhibited on the Web (see fashion shows of Central St. Martin's, London at http://www.csm.arts.ac.uk/37495.htm).

Given this background, the Web may have several functions in design classes, if integrated to the process. At the heart is the design process, which provides for the structuring of Web use.

- *Knowledge content*. Most design classes inject knowledge that has its origins outside the design world. This knowledge can be communicated early on in the process, but also later using the Web.
- *Teamwork*. More often than not, design requires teamwork. The Web can assist in communication beyond just e-mail.
- *Design work*. Web tool may be used to support design work provided that it supports design methods that are typically visual and tangible, requiring a multimedia-based rather than a textual-only environment. (See Dreyfus 2001).
- *Reflection*. Modern pedagogy sets a separate set of requirements. The aim of design education is to raise professionals capable of analyzing problems and solving them in a reflective dialogue with materials, equipment, mentors, and customers. To these ends, design classes typically utilize tools that encourage dialogue and reflection, including blog and studio diaries (see Enyedy and Hoadley 2008; for example, see Tisch School of the Arts at NYU at http://itp.nyu.edu/itp/).
- *Communication*. Finally, for any design work to have any impact, it has to be communicated to outsiders, which sets another set of requirements for using the Web. Typically, designers prepare interactive multimedia presentations and videos to communicate their work.

Combining the process and these functions of the Web gives the following framework for integrating the Web into teaching. (Table 1).

Table 1: Framework: The Web in Design Education, Phase by Function.

		Knowledge content	Teamwork	Supporting design	Supporting reflection	Communicating to outsiders
	Preparatory phase					
Design phase	Introduction					
	Concept phase					
	Studio phase					
	Presentations					
	Aftermath					

There are many things that ease integration of the Web to design education. Designers are typically agile with technology and even if not technically

agile, they are typically favorably predisposed to technology and interested in investing time in learning it. They learn complex 3D modeling programs like Ideas, Rhino, or CATIA. Designers are well versed in 2D graphic programs such as Photoshop, Illustrator, and layout programs like InDesign, and although design is not a visual form of art, a good deal of design works with visual representations such as sketches, technical drawings, and prototypes that can only be communicated with photographs, animations, and videos. Most designers are taught far more complex e-communication skills than most university students, including knowledge of multimedia programs and even programming, sometimes databases, elementary Web skills (elementary HTML and scripting language (typically JavaScript and ActionScript)).

However, a set of other reasons makes the integration slower, some of which are familiar from other fields of e-learning. To mention only a few, *personal reasons and tradition* consist of issues like IT skills, interest in developing teaching, and teachers' preference to traditional studio-based teaching methods. For example, knowing 3D software does not make one an expert in designing for the Web, and especially among older designer generations, Web skills may be wanting, and many things important in design are difficult to deal with on the Web, including the tangible feel of shapes and materials, and the interplay of the hand and the eye. *Organizational reasons* consist of issues like the encouragement and support from management, IT security policies, and access to resources outside one's immediate work real, like virtual teaching platforms and CSCL support staff. *Work-related reasons* affect whether Web can be used or not. For example, some classes require extensive teamwork and media use, and some classes are taught from the distance, which makes Web use almost necessary, while studio-based classes in, say, glass design, have qualities the Web can support only in a limited sense. Depending on the particularities of the design program, these factors play out either for or against using the Web extensively. For example, traditional design schools typically work mostly in studios, and place stress on the skills of the hand rather than teamwork, communication and presentation skills.

3 DATA AND METHOD

This study is conducted at the School of Design in the University of Art and Design Helsinki. By European standards, the School of Design is large. It has about 800 students, and annually, on average 160 students graduate from its programs. This paper focuses on its MA programs rather than BA and doctoral students. At that level, it has five programs: industrial design, applied arts (glass, ceramics, and exhibition design), furniture and space design, and textile art. Approximately 40-50% of students admitted to the School are not native Finnish or Swedish speakers, making English the language of choice in teaching.

The curriculum is organized into three on average nine-week "modules," the first one starting in mid-October, the second in early January, and the third in mid-March. In addition, there are joint studies from early September to mid October. At each module, there are typically 5-7 alternatives from which students can choose, in principle freely, but in practice following their selected specialty. Thus, a textile design student typically takes classes in textiles rather than in glass design.

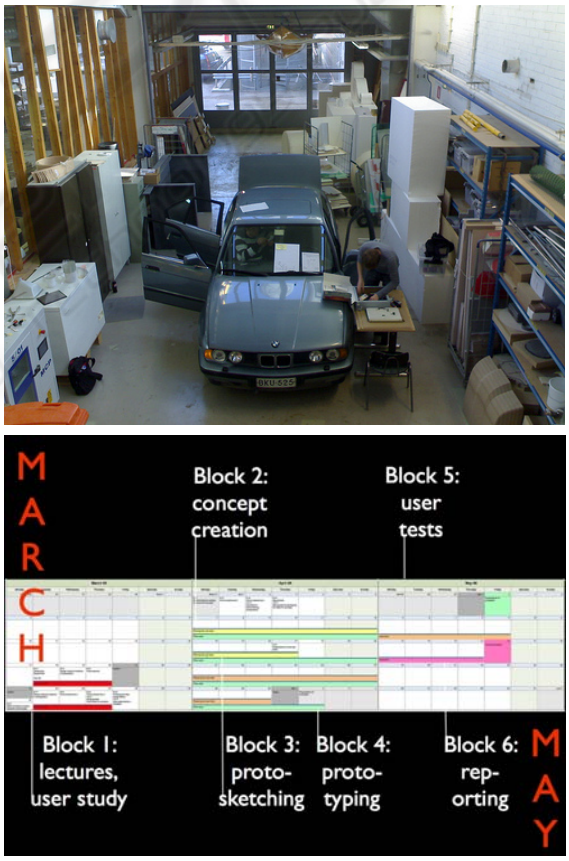

Figure 1 and 2: Up: Studio Space, with Students Building an Embedded System into a Car. Down: The Structure of a Module (Module 3/08, March to May).

In 2008-2009, the School offers 22 modules. With the exception of two modules that are based on

lectures, all other modules have a significant practical component that takes place in studio environment. Picture 1 is from a studio and Picture 2 describes one module in Spring 2008.

Teaching staff can be categorized into three main groups. Professors coordinate and often teach modules. Currently, there are 12 professors who teach. The School's 18 lecturers and 2 assistant professors focus on BA education, but also participate in MA modules. The most numerous group consists of part-time teachers, who are typically either practicing designers, visitors from local universities, or foreign guests. They typically run shorter than a-week-long workshops, and deliver lectures and lecture series on knowledge-based contents.

Data for this paper was collected from three sources. First, I went through the Web page of the School, and other documentation on paper for the academic years 2007-2009. Second, I sent a question to secretaries responsible for coordinating teaching, as well as computer staff responsible for running the Web (N=6). Third, I interviewed deans and those teachers who have integrated the Web to teaching more closely to analyze how they have used the Web (N=7). Since the number of cases was low (the maximum number of modules was 22), analysis was qualitative, following Miles and Huberman's (1994) suggestions for analyzing qualitative data.

With one exception, no integrated e-leaning platforms (for example, Scardamalia & Bereiter 1996) have been used in the School. This exception was one part of the joint module in September, between 2001-2004, which used a learning environment developed in Media Lab, a sister School in the University. The program is not used anymore, for it proved to be unreliable, its usability was wanting, and its pedagogic model proved not to be suitable for design education. The university offered Virtual University services between 2003-2006, when the service closed.

For ethical reasons, I will refer to modules using numbers rather than their names.

4 DESCRIPTION: HOW DESIGNERS USE THE WEB IN TEACHING

Currently, there is no School-wide strategy for adopting the Web, and currently, no support or incentive to integrate the Web to teaching exists. Thus, the current structures stems from the teachers' interests and independent actions. At the moment, 6 BA classes and 9 MA modules have a Web page. Another observation is that there is a clear dividing line between BA and MA education what comes to education on the Web. At BA level, all six classes are integrated to the Virtual University; at MA level, none of the classes uses this service. Only a handful of the School's more than 40 teachers have training in higher education and didactics. Perhaps not unsurprisingly for a design school, at higher levels of education, classes reflect teachers' interests and personalities not only what comes to the main contents, but also to adopting teaching methods and tools.

Table 2: Integration the Web to Design Process. Columns: 1. Preparation of the class; 2. Introduction; 3. Concept phase; 4. Studio phase; 5. Presentations; 6. Aftermath. No data could be found for module 6 due to non-response.

M	1	2	3	4	5	6	∑
1	-	+	+	+	+	-	4
2	+	+	+	-	+	+	5
3	+	+	+	-	+	+	5
4	-	+	+	-	+	-	3
5	+	+	+	+	-	+	5
6	n.d	n.d	n.d	n.d	n.d	n.d	n.d
7	+	-	-	-	-	-	1
8	+	-	-	-	-	-	1
9	+	-	-	-	-	-	1

Table 2 looks more closely at Web usage at the School through the framework exhibited in Table 1. Table 2 shows that in terms of the design process, teachers use the Web consistently in the early phases of the design process (i.e. phases 1-2), but with much less intensity later in the concept design and studio phases of the process. Early in the process, teachers use the Web to advertise their modules to students, and after students have registered to classes, to share content, materials, structures, and news for students. In essence, the Web is an information-sharing device. Also, there is a clear line between heavy Web users (modules 1-5) and other modules. It is as if the Web is either used, or used only minimally.

Table 3 takes a closer look at the functions of the Web. It has two important messages. First, it elaborates Table 2 in one important respect. The Web is mostly used for delivering knowledge content – like sharing lectures, schedules, and other instructions in PDF format – and only occasionally

for other purposes. Second, it elaborates the division line observed above still holds: heavy use concentrates on Modules 1-4, which also have integrated the Web extensively into the design process.

In terms of which kinds of Web techniques are used, only two classes are currently using the Web in an interactive way. In Module 1, the instructor has been using a commercial served based in Switzerland for sharing materials and for communicating with students. The instructor of Module 4 lives in Spain, and flies into the country every few weeks. In her absence, students are required to keep a blog for keeping the process going.

Table 3: Functions of the Web. Columns. 1. Knowledge content; 2. Teamwork support; 3. Supporting design work; 4. Supporting reflection; 5. Communicating to outsiders. No data could be found for module 6 due to non-response.

M	1	2	3	4	5	∑
1	+	+	-	+	-	3
2	+	-	+	-	+	3
3	+	+	+	+	-	4
4	+	+	+	+	-	4
5	+	+	+	+	-	4
6	n.d	n.d	n.d	n.d	n.d	-
7	+	-	-	-	-	1
8	+	-	-	-	-	1
9	+	-	-	-	-	1

The other two modules that use the Web throughout the process use it mostly as a bulletin board rather than an interactive forum for, say, sharing mid-term reports, or for doing interactive exams. It is used to deliver information about the class from teachers to students, and if information from students are delivered, it is filtered through teachers. At the School of Design, the Web is mostly a top-down technology rather than a marketplace of ideas, or a forum of dialogue between teachers and students.

5 TOWARDS EXPLANATIONS

There was no rank-order correlation to how the Web is used to any standard background variable like the age or the gender of the instructor, nor to the properties of the class like the number of students, or the age of the class. It was impossible to predict the reasons for adopting the Web using these background variables.

However, a few recurrent things were related to Web use. Most importantly, with one exception, industrially oriented designers have adopted the Web quicker than others. As Table 3 shows, at MA level, the rift between industrial designers and others is pronounced. At BA level, out of 6 classes using the Web, the same division line is just as apparent. One of these classes was in industrial design, and three in textile and fashion design.

The most likely explanation lies in some of the features typical to these design subspecialties. Both of these specialties are oriented to teaching designers capable for working in industrial settings. They put a premium on teamwork, process, and communication skills, and often prepare students for working in international companies in which IT is essential in coordinating design work. The main difference between these specialties is that industrial design works in 3D digital environment, while textile design is easier to integrate to the two dimensions of the Web. The difference is not crucial, though. In contrast, more artistic disciplines place premium on artistic skills and the skills of the hand that afford integration to the Web with difficulty. Interactive uses of the Web mainly take place in industrially oriented modules. (Table 3).

Table 4: Breakdown of Web Usage by Design Discipline.

Sub specialty	Modules using the Web (%, freq)	Interactive techniques (N)
Industrial and textile design	50% (3/6)	2
Other department	25% (4/16)	1

However, two qualifications are needed. First, it is important to note that even in the more industrial end of design, Web use is still fairly low. These affordances do not explain Web usage as such. Using the Web is far from a standard thing to do at the School of Design; to understand the Web, we have to look at variations between how individual teachers orient to teaching and using technology in teaching. Second, there is an interactive blog environment created for one module (Module 4 in Tables 2-3). This module makes an exception among the more craft-oriented programs. The instructor's response to my query concerning use illustrates well the prevailing attitude among instructors:

> In this class, we got tired of the stiffness of "official" net leaning environments, and built an own one. We have a student tutor who set up the system and maintains it. The

> idea has been to build on open services people already use for other purposes that do not require teaching. We sought an environment for contents, not the other way around. We use blog and Skype. (27 Nov, 11:11).

The absence of policy and managerial support, varying programming skills, restrictive university-wide security policy, and practically non-existent IT support staff leaves adopting technology to personal initiative. These reasons are mostly personal. As already mentioned, one instructor lives in Spain, which makes using the Web a necessity for her. Another instructor uses the Web for sharing his lectures to make it unnecessary to keep a physical folder in library. The third instructor uses the web because his classes teach teamwork, and are too big to be handled without technical devices. The fourth instructor uses the Web to share materials because she brings many people from the industry to the classroom.

6 DISCUSSION

Design as taught in art schools following tradition crystallized in Bauhaus presents an interesting case for those interested in using the Web to support teaching. Design teaching is essentially learning by doing: the crux of pedagogy is doing and integrating knowledge to designs through a controlled process. This process is sometimes based on a traditional master-apprentice model, but modern design goes beyond this model in not only bringing art to the classroom like in Bauhaus, but also in working in multidisciplinary and multi-cultural teams. These processes have properties that make integrating the Web both easy and difficult, through variously at various phases of the design process.

This paper has looked at the Web in one of Europe's largest design programs at the School of Design in Helsinki. At this department, using the Web is not governed by policy or by pushing one particular pedagogical philosophy (see http://www.edb.utexas.edu/csclstudent/dhsiao/theories.html#situated). Rather, instructors at the School are largely left to their own devices what comes to using the Web – or any other technology – in teaching.

The paper has built a simple framework for analyzing the Web at the School. The framework breaks the uses down by two dimensions, by a typical design process and by possible functions of the Web during the process. What we have learned through an empirical analysis is that Web use is unevenly distributed – that is, there are instructors who have adopted it to teaching extensively, while many instructors do not use it at all.

If there is one background feature that seems to explain Web use in the School, it lies in design subspecialties: the more industrial end of design education has integrated the Web more readily than the more craft and art-oriented end of design. Reasons behind this pattern are probably related to the way in which designers at the industrial end work, stressing communication and team working skills rather than skills of the hand or individual personality. However, there are significant variations at work behind this division line. The main conclusion has to be that Web use mostly goes back to the preferences and IT skills of teachers and to the type of the class. For example, the largest classes of the School routinely use the Web throughout the process.

Still, this is only a propensity. The main result has to be that even though the Web certainly has many uses in teaching design, it is far from being the tool of choice for design instructors. Why? Is there something in the nature of design that makes it difficult to use the Web? Can we bring the studio to the Web?

Apparently, our data suggests that there are natural limits in this transition. The affordances of the Web are some ways highly limited what comes to what sophisticated design requires. Issues like touch, feeling, hand, bodily skills, and being able to get immediate bodily feedback, are crucial for designers. Design is not just visual, but also a tangible and bodily. Especially in the artistic end of design, some designers take these qualities seriously, and see the Web as too limited a tool to be really helpful; for them, it may actually misdirect design.

However, some other things can be externalized easily, including dialogical issues like communication, coordination, and instruction (Eneydy & Hoadley 2006). Also, some design fields work through digital means, esp. industrial design, but also textile design; more generally, those design fields in industrial practice is digital (Valtonen 2007). When these skills are in the center of the profession, then the Web gives attractive options for education. Furthermore, some features of design education almost necessitate using Web-like tools. In particular, modern design is increasingly dispersed over a vast geographic area. Coordinating a class in Helsinki while the instructor lives in Spain would be practically impossible without the Web. It has a place in design education, and no doubt will

grow in importance.

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