SKETCHING IS MORE THAN MAKING CORRECT DRAWINGS

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ABSTRACT
Sketching in the context of a design process is not a goal in itself, but can be considered as a tool to make better designs. Sketching as a design tool has several useful effects as: ordering your thoughts, better understanding of difficult shapes, functioning as a communication tool, and providing an iterative way of developing shapes. In our bachelor-curriculum Industrial Design Engineering we developed a series of courses that addresses these effects in particular. As a result we see that students instinctively start sketching in an iterative manner, use sketching as a source of inspiration and learn that the whole process of iterative sketching helps in structuring, developing and communicating the design process. In this way the students become better sketchers and better designers.

Keywords: Drawing, Sketching, Design Education, Iterative Sketching

1 INTRODUCTION
Designers have always used sketching as an important tool in the design process. Sketching in the design environment is different from classical sketching in the sense of making beautiful art-like drawings. Sketching in the design context is often not a goal in itself but can be considered as a tool to make better designs. Sketching is a very direct way of putting your thoughts down in 2D and has several different useful effects as: ordering your thoughts, better understanding of difficult shapes, functioning as a communication tool, and providing an iterative way of developing shapes. The ability to draw fast also plays a role in creative solution seeking processes, because creating more alternatives increases the chances for better ideas [1-2]. In our bachelor Industrial Design Engineering we developed a series of sketching courses based on these effects, in order to stimulate sketching skills as a designer, rather than as an illustrator.

2 EDUCATION
There are three sketching courses in our bachelor program Industrial Design Engineering (IDE): Sketching and concept drawing (SCT), Product Presentation Drawing (PPT) and Applied sketching skills (TTV). This line of courses is now built on three pillars:

- Learning to sketch; Theory, speed and control of the materials.
- Learning from sketching; Developing a better insight in complex 3D shapes.
- Sketching as a design tool; Communication, ordering your thoughts, iterative working.

Next to learning the theory and different drawing techniques it is very important to let the students get familiar with the idea that sketching is more than making correct drawings. So in two-third of the lessons we focus on the latter two pillars by applying the developed techniques in design tasks. The first two drawing courses (SCT & PPT) take 8 weeks and have two lessons of 3 hours in a week. We use the first lesson of the week for teaching and practicing new theory. The second lesson of the week is used for applying the theory in a small design assignment, following a short design process. The course TTV in the second year of the bachelor program is based on the use of a sketching tablet in a design process. There is one lesson a week and the course takes 8 weeks. The basis for this course is the theory from the first year and it focuses on the technique used on a tablet and applying tablet-sketching in design processes. The first lessons of this course focus on getting used to the tablet so the students have to sketch a lot. The second part of the course we use different tools, e.g. foam models, photos, CAD-models, in combination with tablet drawing. The students have to use these tools for a project they are working on.
2.1 Learning to sketch
To make effective use of sketching as a designer it is important to know the basic rules of sketching. Things like perspective, point of view, basic shapes and rendering techniques can be learned in classic theoretical lessons, based on the work of Eissen and Steur [3]. Students have to practice a lot with the new principles and materials to get familiar with them. Besides knowledge they also have to train their motor skills.

We use fineliner pens as a basic drawing material so the students can’t erase their lines. That’s a deliberate choice we made so they cannot erase mistakes and have to carry on. In this way the students have to develop a certain confidence in drawing. Figure 1 shows some typical work students do in the theoretical lessons. They start with learning how to draw basic shapes as a cube and cylinder. Later on the students learn how to combine these shapes and draw more complex constructions like chamfers and fillets on a cube. To let the students really experience perspective we introduced a lesson where they make sketches in the hallways of our faculty.

![Figure 1. Example of students' work: typical sketching which is done in theoretical lessons.](image)

2.2 Learning from sketching
We strongly believe that by sketching and constructing new shapes people get a better insight in 3D form complexity. When people train their knowledge of complex shapes by drawing them often, they develop a better feel for these forms and increase their ability to develop new ones. So we learn the students to draw in a constructive way. They have to construct their sketch instead of sketching on sight. They have to draw in wireframe manner to get better insight in forms and connecting different shapes. By letting the students construct from real life products we train the students’ sense of proportion. We developed a step by step approach to train the students’ insight in forms. At first we teach the students to combine geometrical forms that they learned to draw in the first theoretical drawing lessons. Jan Corremans [4] has introduced a straightforward way of iterative form-developing through sketching. Students learn that a lot of relative complex shapes are designed by combining simple geometrical shapes (figure 2).

In this stadium it is wise to give simple assignments so the students will have the sketching ability to complete the assignment based on the students’ limited knowledge of sketching. In this way the students can focus on the process of developing shapes instead of the sketching itself. Parallel to ‘learning from sketching’ the students learn that drawing a lot of shapes helps them in developing better forms. When sketching from real life products we see students really examine the products to understand the construction of the form. They have to really understand the shape before they can draw it. This also works the other way around because when designing, students really have to understand the shapes they construct a by themselves. So this way of sketching helps the students in getting a better understanding of the way shapes are built up. In other fields, as for instance CAD-drawing, this is also very useful.
2.3 Sketching as a design tool

The principle of iterative working is a well proven concept in design engineering [5-6]. This principle is also embedded in the whole bachelor program. Firstly in hand sketching, but later on also in tablet-sketching, Photoshop, 3D foam models, graphic design programmes, and CAD. This way the students learn that the rules and skills for successfully developing your design with all these different tools are exactly the same as with two dimensional sketching. We try to develop a certain attitude in the first year of the study in which students get familiar with the idea that just following some simple rules will deliver them design results. Lack of inspiration can never be an excuse anymore. Freshmen have the tendency to take their time when developing designs, patiently waiting for inspiration to ‘fall upon them’. All the drawing teachers have a background in design practice, so we know that time is precious in a design process. But not only from a realistic point of view some time pressure is positive. We experienced that by pushing the student to sketch fast, they improve their design output. This is also supported by Yang [7]. Students tend to be unsecure about their drawing skills and forcing them to just put the pen on the paper gives surprising results. But after an hour of quick and dirty sketching they see that they came up with ideas they did not have at the beginning. As mentioned before, this focuses on the idea that sketching is not a purpose in itself.

To extend this principle we developed some assignments under strict time regulations, where we actually use a stopwatch to put the pressure on the students. For example we introduced an assignment where the students have to design a perfume bottle. In an earlier lesson that week they have learned the backgrounds in drawing glass in a quick manner. We present them a tight time schedule so they know that there is no time to waste. There is only 45 minutes to develop a nice shape. To encourage iterative working we deliver examples of nice sketching on the big screen. The teacher and the student-assistants are meanwhile constantly walking through the drawing room asking questions and giving tips and tricks.

The exercises start with drawing rough shapes with pencil. For most students it is easier to start with some 2D drawings to get a sense of proportion, and get their imagination working. It is important to force the students to translate the 2D to 3D sketches because sketching in 2D can contain a lot of ambiguity. After about 20 minutes rough sketching we ask the students to choose their best sketch. The students have to reflect quickly on their sketching and make more sketches with fineliner pens in a second round based on this choice. The last 5-7 minutes we ask them to focus on detailing of the design. After 45 minutes of quick sketching they have another 45 minutes to make a sketch in which the design is presented in a combination of 2D and 3D sketch. The students hereby learn that working in a structured way for a short period delivers results. We have learned that reflective moments and a strict time schedule helps students to focus on the development of a design. It is our aim to loosen the strict regulations as they become more skilled. Figure 3 gives an impression of the results of assignment described.

Figure 2. Example of students’ work: straightforward development of shapes
Communicating ideas through sketching is another important aspect. Again we try to learn the students that not only the last perfect polished drawing is important but the sketches that led to this final drawing are also useful. In figure 4 there are different examples of communicating through sketching. On the right there is an example of communicating the form development. Mentors, or later clients, can have an insight how a shape is developed and so have a better understanding of the idea the student has. On the left there are examples of communicating a complex shape and the construction of a product.

Eventually students have to find a tool which allows them to work and communicate in an iterative but structured way: the sketch itself is not important, it is the idea that it represents. This way of working is further enhanced in (and mandatory for) other design courses of the bachelor curriculum where the students use these skills for developing designs in a cultural context [8].

3 DISCUSSION
Despite the positive development we still notice a difference in attitude with the students, when approaching other assignments and the assignments in the drawing lessons. Students tend to be more cautious when they are working on a project. To overcome this gap, we started giving short workshops within the design projects, to emphasize that the way of working learned in the drawing lessons can perfectly be applied for the different projects. We learned that this is useful because students can actually see that, in a few hours work, they produced results that can be used for their design project one on one.
We now see that more and more students instinctively start sketching in an iterative manner when they are given a new design assignment. As freshmen, the students often try to sketch the final drawing at the start of the process. We now see that after the first drawing courses they really start using their sketching skills to do design explorations. Students have learned that inspiration is not something you always have time for waiting. So when the inspiration is low you can trust on yourself and start working. Figure 5 gives an impression of students work in a second year course called ‘Human Product Relations (MPR)’ [9-10]. The students were asked to draw a digital camera for the thirties. They were not asked to make a lot of sketches. Most of the students automatically started to make explorations instead of one final design.

![Figure 5. Example of students’ work: Spontaneous iterative work in other projects.](image)

A critical remark should be made about the path-dependency of the iterative sketching method. When there is too much focus on the development of the shapes at hand, the exploration of other solution directions can be reduced. The implementation of a basic divergence/convergence or generate/choose design-cycle can help to insert moments of critical reflection.

4 CONCLUSION

Every student is blessed with a certain level of talent for drawing, but we experienced in our lessons that every student is able to reach a satisfactory level in drawing. Besides teaching the students how they can draw, it is important to learn them the important role that sketching -and in particular iterative sketching- plays in the design process. They experience through our sketching courses that not only the end result of sketching is useful, but the whole process of sketching helps in structuring, developing and communicating the design process. By giving them lessons that are specifically developed for this goal they become better sketchers and better designers.
REFERENCES


