SKETCHTUBE; INTEGRATING DIGITAL MEDIA IN THE EDUCATION OF DESIGN SKILLS

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ABSTRACT
In this paper we discuss the application of new opportunities and chances of digital learning in design education by means of the implementation of a digital sketching forum into a sketching course.
The so called 'blended learning' method combines face to face education and a digital forum called SketchLab where students can watch instructional movies (SketchTube) and discuss their designs with each other but also with teachers. The first results of using SketchLab are promising. Students encouraged each other to improve their skills and implement new techniques and the activity on SketchLab continued also after the workshops. The use of this specific digital sketching forum led to more activity in the design process of students and encouraged them to improve their sketching techniques and to become better designers.

Keywords: Sketching, design education, blended learning, digital media, sketching forum, Sketchlab

1 INTRODUCTION

The use of digital media is invading our social lives. Students are sharing their thoughts and ideas via Facebook or Google+, Whats App and other digital media. Should these digital media also be a part of our professional career and even deserve a place in an educational setting? Will there still be teachers standing for a classroom in the future, or can this also be done digitally? Should students be restricted by the physical educational environment when they want to learn something? The way of teaching and learning by students will change in the future, but it probably will be a gradual transition. To test the effects of new educational forms we developed a digital sketching forum to encourage students to share their designs. This environment enables students to communicate in groups and discuss their designs with each other but also with teachers. This paper will focus on the effect of using the digital sketching forum in the education process and will show the results of the course evaluation. We start with discussing the role of the teacher in the development of sketching skills.

2 ROLE OF THE TEACHER

A lot of research is being done on the effect of implementing e-learning in education. Some suggest that e-learning is unique and will give students the opportunity to follow classes all over the world [1] On the other hand we still know little about implementing e-learning to facilitate learning in the most efficient way [2]. So there are a lot of opportunities, but these opportunities can easily become risks. The one aspect that most of the researchers agree about is the evolving role of the teacher. This role is not limited to being the presenter of knowledge anymore, but goes way beyond that. The teacher is more and more responsible for adapting freely available knowledge in the right way, so the students can get the most benefit out of it. The integration of digital media within courses can be an appropriate tool to facilitate this new role.
Using digital media in secondary school classes is already tested before. For example the introduction of the 'one minute physics movies' that explain the basics of physics [3]. The main goal of these movies is to transfer quite tough knowledge in a more accessible way. But can this also be done by a more applied discipline such as sketching? The education of sketch courses in our curriculum is now mainly based on integrated education where the teacher presents some theory and the students will practice the knowledge immediately. Therefore the sketch courses are the most labour intensive courses of our curriculum. At the other hand we strongly believe that only offering the knowledge on a digital platform will not be sufficient. The teacher is still needed as a facilitator and as an expert to intervene in different educational settings so the student can be challenged in the right way.

In fact a combination of a digital sketching environment and the teacher in the role of the expert could be fruitful. This method is called 'blended learning' and can be explained as the combination of face to face education and online learning activities to improve the results of education [4]. This combines the advantages of both forms of education.

3 SKETCH EDUCATION

Our bachelor program Industrial Design Engineering (IDE) exists of three sketching courses with a study load of 2.5 European Credit each; Sketching and concept drawing (SCT), Product presentation drawing (PPT) and Applied digital sketching (TTV). The first two sketching courses are introduced in the first year of our curriculum, where the students learn the basics of their technical drawing skills (such as perspective, shadow, applying different materials such as chrome etc), but also learn to integrate those skills into the design process. The duration of both courses is eight weeks, where the students will have two lessons of three hours in one week. The structure of both courses is built on weekly themes, for example 'simple geometric forms'. The first lesson of the week will focus on practicing new theory based on the theme, the second lesson of the week is used for applying the theory in a small design assignment. The skills are practiced in class, so the students will be able to apply the acquired knowledge immediately.
The Applied digital sketching course in the second year of the bachelor program focuses on the use of a sketching tablet in the design process, elaborating on the theory from the first year. The duration of the course is 8 weeks where the students attend one lesson per week.

Figure 1. (a) example of SCT, (b) example of PPT, (c) example of TTV

Besides learning students the basics of sketching, the main intention of the three courses are to learn students to use their sketching skills as a designer. In fact, in order to become a better designer, it is even more important to learn them to use drawing as a communication tool and to use sketching as a medium to order your thoughts [5, 6]. The more classical approach of understanding and applying the technical skills of drawing is of course still integrated, but the focus of the sketching courses are to the utmost extent based on providing an iterative way of developing shapes. It is also known that freshmen need structured working processes, because they start without design experience they can rely on. Professional designers gather a lot of experience in practice and because of that they design more intuitively correct. According to Dorst [7], novice students consider the objective features of a situation, as they are given by experts, and like to follow strict rules to deal with the problem.
We provide this structure for instance by using the rational form development method of Corremans [8]. In this step-by-step method, students are encouraged to design complex shapes that are build up from simple geometrical forms. In this approach the students are forced to draw a lot of product alternatives, even if they differ just slightly from each other. In the end this will not only practice the sketching skills, but also leads to better designs. So to summarize the previous: improving sketching abilities is not only reached by learning basic sketching rules, but it is also necessary to practice the acquired knowledge in the design process and to create a lot of alternatives to increase the chances for better ideas [9]. The integration of a sketching forum has to support this goal, so our question is: will a digital environment still stimulate students in sketching a lot of alternatives?

4 PITFALLS

Our experience is, that for beginning design students without any experience at all, designing a product is really a difficult job. Especially when they have to perform on their own, without guidance from an expert. The most frequently cited statement during sketching assignments is 'I don't have inspiration'. Research proves that creating more alternatives increases the chances for better ideas, so

lack of inspiration can never be an excuse anymore [10]. In this case the teacher plays an important role in activating the students to sketch a lot of alternatives. Otherwise these students would be satisfied by the first clean sketch.
Furthermore novice students tend to be very insecure about their drawing skills. They rather fine-tune one drawing for several hours than make lots of sketches to improve their design. When these students perform their assignments at home, there is the risk of a lack of sketch quantity. Moreover the structure of the course is also an important factor in accomplishing the task of an assignment. The way a course is designed will influence the activity and also the pleasure of the students. In order to implement a digital forum in a successful way, we have to take into account these pitfalls.

5 APPLIED SKETCHING SKILLS

In the course Applied digital sketching (TTV) the students perform the complete design process on a tablet. The first four lessons of this course focus on getting used to the tablet, so students are able to communicate their ideas. In the second part of the course the students are integrating different tools (photos, Cad modelling, foam models etc.) in the design process to design a specific product.
Within this last part students have to make a redesign of a small consumer product. The assignment starts with a design brief where the problem is stated. All the students have to follow a design process of four steps (ideation phase, concept phase, realization phase, usability phase). In this design process they have to develop a series of 40 sketches (ideation phase) and they have to use photos as an inspiration source to present three concepts (concept phase). Subsequently they have to integrate the technical components of a product by using a CAD model (realization phase) and think about the interaction with the users and the environment by using a foam model (usability phase). During four workshops they learn how to integrate these different tools in the design process by using the sketch tablet. Overall the course is quite successful, but the quantity of sketching is still a problem. In the first two years we asked the students to develop about 40 idea sketches by themselves, but in the end it seems that almost no one could satisfy this requirement. Based on this experience we decided to change the set-up of the course and introduced a digital learning environment called “SketchLab” and four new workshops that provide the students with a structured support in the design process.

6 SKETCHLAB

In the second part of the course the digital sketching environment is introduced. SketchLab is an website in the form of an community where the design results can be placed and discussed by the students. By giving them assignments during the workshop the students will be activated to sketch several designs. After each assignment they have to place their unfinished design on the sketching environment and are asked to give feedback at the work of at least two other students.
Both students and teachers can react on a shared design, so the feedback on their work comes from different viewing points. Furthermore SketchLab was also used to introduce short sketch movies to explain some of the basics in tablet drawing (figure 2). The integration of SketchTube, as we called it, was also very successful. Some of the students even made their own movies to show how a specific skill can be applied into the design process.

Figure 2. (left) screenshots from SketchTube, (centre) Interface of Sketchlab, (right) forum

7 WORKSHOPS

In order to support the students in the design process to improve their sketch quantity four new workshops are designed. Before the workshops started all the students had to choose a specific case from a selection of cases provided by the teaching staff, which were introduced by a design brief. The assignments are individual but the students form case groups together, so they can discuss the subjects and learn from each other. A group of four students is working on one case.

7.1 Workshop 1

In the first workshop they have to perform the idea phase together. Different techniques are used, like silhouette sketching, where the main form of the design is being explored. The students are sitting together in a group, like a carousel. All students of each case group have to sketch about 10 ideas in 20 minutes per session. Subsequently they have to pass on their work to the one sitting next to them and they have to evolve on the idea phase of another student. In this way they are forced to sketch a lot, because the other group member is waiting for input. The carousel sketching will be repeated four times, so in the end of the workshop about 40 sketches are made using different techniques by different designers and each group member receives the output of three different designers based on his or her first idea sketches. In figure 3 some results of the first workshop designing a razor are visualized.

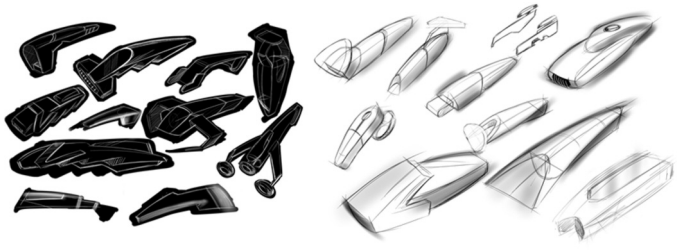

Figure 3. Example of the output of workshop 1 with (a) silhouette sketching and (b) rough sketching

7.2 Workshop 2

In the second workshop the students are going to develop three different concepts based on the idea phase of workshop one. Before the workshop started they have to select the most interesting sketches of last week. In the workshop they are going to elaborate the sketches into three design concepts. To make this a bit easier the students are allowed to use photos of existing products as a background layer. Using the existing photos will help students to draw the main form correctly in perspective and the 'stereotype architecture' can be used as a support when adjusting the main form of the new concept. When the output of the idea phase delivers quite exotic forms, it is harder to use an existing product photo as background layer. In these cases smaller parts of the photos can be used to fine-tune the presentation of the three concepts, such as the shaving heads in figure 4. The presentation of the concepts will therefore be more realistic. In the end students have to discuss the different concepts with each other via SketchLab and choose a final concept direction.

Figure 4. Example of the output of workshop 2 using a photo as background layer

7.3 Workshop 3

In the third workshop the students have to integrate the technical components of the product by using a CAD model. Before the workshop the students have to design the (simplified) basic functional elements of the product in CAD, such as a battery pack and a PCB. In the workshop they have to prove that all the elements will fit in the main casing of the product. They can also show how the technical components are placed into the casing by drawing a exploded view of the product (figure 5). Preliminary results are again uploaded in SketchLab and can be discussed by all participants.

Figure 5. Example of the output of workshop 3 integrating CAD components

7.4 Workshop 4

In the last workshop the students have to show the interaction with the user and its environment by integrating a foam model. Before the workshop the students have to make a foam model of their final design. In order to explain the use of the product they have to make photos of a person or a hand using the product. In the workshop they will clarify the use of the product by making sketches of different use stadia (figure 6).

Figure 6. Example of the output of workshop 4 integrating foam models

8 EVALUATION

The implementation of SketchLab was evaluated by twenty participants including three teachers, seven student assistants and ten regular students who followed the course. In the evaluation students mentioned that they appreciated to receive comment on non-finished work by other students, student assistants and teachers. They also like the community of a group to discuss their designs. The sketch forum stimulates them to improve their skills and to discuss about the decisions they have to make in the design process. Because the environment was accessible at all times, students were sharing their designs also after the workshops with other students, student's assistants and teachers.

Furthermore students were encouraged to improve their designs based on the comments on their posts. During the carousel workshop they were challenged to improve their sketch quantity and to develop their sketching skills in a more iterative way. Before the workshop started some of the students were a bit reluctant to doing the workshop, because they were afraid of not performing well. Nevertheless during the workshop they really liked this way of iterative sketching, because they received a lot of input from different perspectives. One of the students commented: "Normally after developing my first idea sketches I really find it very difficult to deliver more sketches in different directions. By joining the workshop four students made different idea sketches and in the end there were quite a few nice idea directions".

The combination of face to face education and using SketchLab as a forum provides students with advantages of both educational resources from the so called 'blended learning' environment. SketchLab will keep students active in discussing about each other's designs and improve their sketching techniques even after the workshops. The workshops themselves (led by an expert) will keep students active and force them to sketch more iterative in the beginning of the process.
Also, we will introduce realistic cases from design practice, which will be introduced by the companies themselves. Probably this will lead to an even better kick off of the project, and furthermore the companies can use our digital sketching forum to keep track of the design processes and give the students feedback.

9 DISCUSSION

Despite the fact that the results of using a digital sketching forum were promising, there were also some improvements that could be made. We experienced that the students with minimal sketching qualities did not like to upload their 'ugly' sketches when they were in a group with three very good sketchers. On the other hand groups that consist of all less talented sketchers are not encouraged to raise their standards. To prevent this problem, we have to mix the high quality sketchers with the less experienced sketchers more carefully, so they can really learn from each other.
At the same time there was also a group of selected students who were asked to design for a more complex case: the design of a new car. We selected students with very good sketching skills for this case. They really inspired each other to make better designs and the results of this group were splendid. It was specially noted that the activity on SketchLab for this group was very high. So this latter strategy pays of, but you have to choose whether you want excellent results from a limited number of students or more evenly divided achievements.

10 CONCLUSION

To answer the main question, we experienced that the use of a digital sketching forum enhances the sketching results of students and leads to more activity in the design process. On the other hand, because the workshops played a major role in the developing of structured design process skills, the use of the digital SketchLab environment will never be a replacement for an excellent teacher. The new opportunities and chances of combining 'digital learning' and old school face-to-face workshops will have great significance for the future.

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