

Facilitating for Non-Design Major Students Using Design Thinking and Sprint Method

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Abstract

Today design play a great role in facilitating and evolving human lives by recreating friendly object in our everyday lives as connecting with various field. Reflecting these trends, we choose the existing object around us and try to reinterpret and redesign them from the viewpoint of engineering students. This study method is a case study and covers about 110 students who attend the 'Design Thinking' class of a university in the 1st semester of 2017. A team of six to seven students and total of 18 teams are required to design a take-out coffee cup based on class for design elements and design tool. First of all, engineering students with no design knowledge have been able to verify that design thinking is possible in a short period of time through repeatable and diverse design experiences. Second, the team's activities are more likely to be high accomplishment and achievements than individual activities. Modern society is becoming essential for the convergence of design into divers fields. Through the study we hope that engineering students will have developed a design thinking that would organically connect their fields without separating their fields and designs.

Keywords: *Design thinking, Design in daily life, Convergence education*

1. Introduction

1.1. Background and purpose

The phrase 'design is competitive' is no longer alien to us[1]. From a ballpoint pen that we use every day to automobiles, buildings, and even urban development projects, design has become our own life itself. It is not too much to say that the success of countless products depends on design. In 2016, Korea Trade-Investment Promotion Agency (KOTRA) compiled 99 out of 164 foreign items from 126 countries worldwide and wrote a report titled 'The Sparkling 99 Innovative Products'. The report identified nine products that approached consumers through the convergence of design and technology in the field of the design innovation, which included some of the following: 'FoFo Cup' is a portable foldable cup that is permanently available. The developer's experience became a design motivation. When he drank a cup of water from water purifier in a library, there is no paper cup and he grabbed it by hand. The inventor realized that people cannot always carry a can of bottled water or glasses, and he came

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up with a portable product that is easy to carry. Another product is a uniquely curved shower from Methylen in New Zealand called the “Aurora Jet Shower Sprayer,” which is famed for its excellent design in New Zealand. The water is controlled by the nozzle inside the shower and it is sprayed in accordance with the outline of the shower head. As it minimizes the contact surfaces to make the fine water spray and it helps water saving. In addition to this, products that are closely related to our daily lives have been chosen such as unbreakable sharp <Delguard>, cutting board <Sharp & Matrix> that minimize the inconvenience in cooking process.

The latest design field has helped to improve the quality of life in various aspects of our everyday lives by blending the familiar items in our everyday lives with science and technology.

This study aims to select objects that are familiar to us and to design them by reinterpreting them with the eyes of students enrolled in science and engineering focused universities.

1.2. Research method

This study was conducted with about 110 students who attended the design thinking session in the spring of 2017. Students were formed with various majors such as environment, natural sciences, urban environment, electronics, computer science, engineering and human design engineering. The courses on design elements and design programs were preceded and the final project was designed and executed by designing and producing takeout coffee cups.

2. Theoretical background

2.1. Changes in design paradigm

The design paradigm was first introduced during the 18th century industrial revolution [2]. As the traditional handcraft is transformed to machinery to mass production system, people have created a new concept of design that is fundamentally different from conventional art in order to sell the products to a variety of people. At that time, the design was focused solely on aesthetic roles, regardless of the functional area of the product. However, as technology advances and times change rapidly, consumers have come up with designs that allow them to enjoy the beauty of their products as well as usability in their lives as combining the design with a various field such as psychology, science, human engineering, and environment [3].

In other words, if the design of the past has been used as a means of stimulating corporate material consumption, today’s design is more important to create a harmonious environment and enrich everyday life[4].

Karim Rashid, he is a designer who plays the role of New York in various fields including fashion, graphics, lighting, furniture, installations, architecture. <Garbo bin> (1996) from Umbra, one of his best-known works of his, is different from what we used to see in the past. The trash can has a voluptuous form like a vibrant bloom flower, and it is easy to put garbage in the can because the top is wider than the bottom. Also, as the grip parts are designed to be higher, when we took up the trash can, it prevents our hands from touching the trash directly. In this way, he proves that he can make person and the world better through living design [5].

2.2. Changes of consciousness about design

As you see the <VasoCyclik> (2006) by BitossiCeramiche, <Pleasurescape> (2005) installed in Pinakothekdermoderne including <Garbo bin> (1996) by Karim Rashid mentioned before, we can feel happiness and joy in everyday life. What is the design democracy Karim Rashid says? It means that as a reasonable price and approachable item, it will enable as many people as possible to use. That is, it should be designed for a majority, not a minority. At that time we were economically difficult, or a developing country in the 1960s and 1970s, when we needed a basket of garbage at home, we just bought the cheapest trash can ignoring the design. Then, when you go to work, you change your mind when you buy a trash can. If you do, you will have a good look at the shape and function of the feature. In other words, the products by necessity turn into the products bought by want. At this time, we buy a trash can designed by Karim Rashid and recognize a gorgeous line, a brilliant color and a sense of elegance, and we can have a better feeling of life than ever before.

2.3. Design sprint

Design Sprint designed by Jake Snapp who is a partner of Google Ventures is currently used by various companies including Google and Airbnb to collaborate with new ideas and attract more aggressive participation and support[7]. It is usually used to make new ideas into prototypes and make them faster and more efficient. The reason is that the time is limited, and the design team is able to concentrate purely on achieving visual outcomes in a short period of time, allowing people to become more enthusiastic when they join the creative process.

3. Research method

3.1. Method of selecting a target

The research team consist of six to seven students majoring environment, natural sciences, urban environment, electronics, engineering and human engineering, and project is conducted for 13 weeks. In the beginning of the class, various tasks that rectilinear form, line study and construction paper were performed in five weeks to learn the elements of design such as dot, line, surface, proportion etc. Next, students worked with Photoshop, Illustration, 3D Programming and Projection mapping for 5 weeks to develop a sense of color, composition, etc. Based on the lessons learned earlier, the takeout coffee cup design was selected as a final project assignment. The final task was to elicit ideas from students in a short period of time by utilizing a method called design Sprint and make them submit the result in a short time. Each of the results from 18 teams was shared through an exhibit at the Community Center.

3.2. Teaching method and curriculum

3.2.1. Elements of design

Before designing a product, we focused on waking up the design sense of engineering students. By describing the design elements and making them in person, students are required to continuously develop their sense of proportion, volume and

harmony for a month. Before forming each design element directly, drawing was preceded [3].

- (1) **Rectilinear form:** There was a need to develop a sense of mutual complementary proportion and harmony with the task of establishing relationships with the three dimensional shapes of different characteristics, namely, Dominant, subdominant, and subordinate.
- (2) **Line study:** As a variety of curves and combination of lines by using the wire, third-dimension, dynamics and proportionality could be learned. It is designed to familiarize the understanding of design elements on the line and characteristics of the materials.
- (3) **Construction paper:** By bending the paper and presenting the inclination and direction, it created an interesting form of expression, which allowed students to develop a sense of contrast, proportion, and harmony.

3.2.2. Design tool

(1) **Photoshop/ Illustrator:** Using the free and diverse editing functions, students were encouraged to expand their colors, feelings, and configurations and enhance their creativity and aesthetic sense.

3D Program/ Projection mapping: Through various methods of expressing realism, space sense, and three-dimensional sense, it has fostered originality and aesthetic sense of color, composition and expression.

3.2.3. Design execution

Coffee Cup Design: Through the design elements and design tools, sense on color, materials, illustrations, and lights were developed. And then, the coffee cups design was conducted in the final three weeks for a final exhibition in the community center.

To begin with, students are asked to look at various kinds of coffee cups and visit coffee shops to get ideas and inspiration from the beginning of the project, and share diverse ideas and feedbacks in each team. Then, in a short period of time, as it is difficult to gather at the time due to classes of each of members in an every group and we encourage them to use several method of design sprint to rapid decision-making and process progression. Among various opinions, the fresh and new ideas are decided quickly through the vote, and in this process, each group was allowed to review the feasibility of their ideas. In addition, based on the final design, roles were divided to shape the methods, materials, colors, concepts, etc. and enable them to move quickly within a limited period of time. During the course of the production process, each group used the design tools learned from the class, or other programs such as CATIA, which were taught in their major. The final works were exhibited by team on June 5 through June 9 at the Community Center and presentation was conducted. Also, through the exhibition, we hoped that even students who did not attend the Design Thinking classes to have interest in design area.

4. Final works

We selected objects that were familiar with everyday life and required students to perform tasks in accordance with the aforementioned curriculum. Some examples of representative work from classes are as follows.

The first is a coffee cup with a kettle-shaped lid. This cup can control the amount of Espresso to suit the tastes of consumers. The bottom of the pot shaped coffee cup is made of silicone, and inside is empty and it forms a cool kettle when filled with espresso. Consumers are able to control the amount of coffee with a lid, which is filled with Espresso. And then, once he hit and cut through the bottom of the lid, he could drink coffee through a straw. This is because the espresso residue on the lid would no longer be leaked in the coffee cup due to pressure between straw and rubber bottom.

The second is a cup holder with a stretch capable in the upper and lower direction. When folding the holder in the lower direction, it works as a support. On the other hand, when carrying around the cup, you can stretch the holder and it is designed to serve as a guide.

Third is the coffee cup lid that holds the straw. Produced by 3D printing, the brilliant product is designed to promote Korean traditional culture to foreigners, as well as to inform foreigners of the attractiveness of Korea by adding flavour to Korea's traditional clothing. The lid of the cap is protruding, avoiding a separate straw, and also prevents it from spilling when drinking coffee.

Finally, this is a palanquin-shaped coffee cups carrier. The fresh idea was obtained from our traditional transportation. Also, it is novel in that in the side, it is designed with open window. This is also a good design for foreigners visiting Korea to promote Korean culture by designing Korean traditional beauty.

In addition, there is a collection of works such as a Korean traditional fence-shaped carrier and transparent cup holder, and some of the works of art are applied to 1 patent and 14 utility model patent.

5. Analysis result and expected effects

Based on this study, the following results were obtained from 'Design Thinking' class designing a coffee cup with engineering students.

First of all, even engineering students who are lack of design sense can develop the design thinking abilities in a short period of time when repeatedly educating them on stage about design elements and design sense.

Second, the achievement of cooperation by a team is greater than that of individuals. This is because students who study various majors in a team are brainstorming in various directions. In addition, they can quickly create products within a limited time by sharing a role according to their own abilities. Thus, it is verified that the design teamwork increases not only the accomplishment of the work but also fulfillment of the individual through complementary work and synergy effect.

6. Conclusion

It is no exaggeration to say that our daily lives are design itself and designs are our daily lives in a modern society. The design is always around us like air, unaware of the importance [8]. Today a good design is not grandiose and something special."It's a good idea to think about how convenient people can feel or how to feel happy and pleasure

when they use it. "As the French famous product designer Philippe Starck said as above, it is ideal that we breathe beauty and convenience in everyday objects that exist around us and if these things melt into our lives, and life becomes more comfortable and lively. However, the design of the current era is limited in itself, which requires diverse elements such as human engineering, environment, psychology, etc.

Through this lesson, we were able to confirm the ability of students to develop design thinking skills. We hope that students will be able to utilize the concept of design thinking and creative problem-solving skills to solve complex problems by understanding the needs of the ages, the market conditions, the consumer's needs, and blending with their own expertise.

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