

THE CREATIVE INNOVATIVE RESEARCH AND DEVELOPMENT OF THE MOUSE

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ABSTRACT

There are new laptop designs being developed constantly. Yet, designs and functions of mice have not yet kept up with the trend of technology. For this reason, in this study, the teachers and the student had discussed face-to-face and performed video conferences for the design and development of innovative mouse products. And the developed products include an extra-convenience portable mouse and a crystal mouse. Each of the products stands out with its own unique features and functions and is very creative and with great aesthetics.

Keywords: *Innovative Product, Product Design, Design and Development.*

1. INTRODUCTION

Nowadays laptops have been designed lighter and easier to carry while designs of mice have not yet kept up with this trend. Some mice are too big to carry around, while others are too small to have a good feel and enough functions. For this reason, this study was dedicated to the design and development of innovative mouse products. A total of two models were completed, an extra-convenience portable mouse and a crystal mouse. The first one, the extra-convenience portable mouse, was developed based on the bionic design of a shark, with a large touch panel. The clip-like shape makes it possible to bite a laptop like a shark, so that it can be carried around more easily.

The second one, the crystal mouse, was designed because there are usually stains left on the surface of a mouse after it is used for a long time. In cases with a user who sweats a lot of who often eats while operating the mouse, the hygiene issue is even more serious. However, it is difficult to clean a traditional mouse. Most wireless mice are powered by dry cells. And this is not an eco-friendly design at all. The crystal mouse was developed to resolve these problems. Its appearance is simple and fashionable. Its case can be disassembled and separated for cleaning. And it can be charged wirelessly.

2. LITERATURE REVIEW

Hue is the name of a color. Value is the degree of how bright a color is. Chroma is the degree of how colorful a color is. Colors may influence people's minds. Using a specific color can create a specific visual effect. For example, some colors make people feel warm, while some make them feel cold. Using a combination of colors of consistent hues may create some consistent and slightly illusionary impression. Using a combination of colors of consistent values, even a combination of many colors, may create a balanced overall impression. A combination of colors of low chromas may create a sense of steadiness, while a combination of colors of high chromas may create a sense of freshness [7].

An image can be defined as a bivariate function $f(x, y)$, where x and y are special coordinates. For any point in an image, the corresponding f value is the intensity or gray level of that point. If the f values for all x, y of an image are finite and discrete, this image is a digital image. And digital image processing means image processing using digital computer software. A digital image is composed of finite elements. Every element has its own specific position and value. These elements are called picture elements, image elements, pels, or pixels. Applying image processing to colors helps to simply target identification. Colors can be extracted from scenery. There can be thousands of hues and intensities for colors. Properties used to

distinguish colors include brightness, hue, and saturation. Brightness concretizes the concept of color intensity. Hue is related to wavelengths of mixed light waves, representing the main color observers perceive. Saturation is the relative purity or the amount of white light of a mixed color [5][6].

When creating images of object, computer graphics software can be used to integrate some commonly used features to increase the sense of technology of overall images and enrich images with various elements. Besides adding computer objects, creators can also adjust background colors of images to address main hues and increase 3D feelings [6].

This study summarized and explored the information related to the influences of colors on the visual aesthetics created by computer graphics, as the reference for the teachers and the students when designing the innovative mouse products.

3. TEACHING AND LEARNING OF INNOVATIVE PRODUCT DESIGN

Teaching is often considered as an art. In their teaching processes, teachers can, only through their reflective thinking, be like artists, developing and brining out their internal potentials. The key characteristics are: (1) caring ethics: teachers trying to understand their students and showing concern for their students in all sincerity; (2) constructive orientation of teaching: stressing that students are active participants in a learning process who would actively construct meanings from interactions between their past experiences and personal goals; and (3) problem solving in teaching: aiming to mold students into efficient problem solvers. From the aspect of structures, reflection can be categorized into: creative reflection, caring reflection, critical reflection, contemplative reflection, and collegial reflection [3][2].

Creative thinking teaching focuses on teaching with improving students' creativity as orientation, complete development of students' thinking capability, and facilitating the ability to adapt to challenges in the knowledge society, with the purposes of cultivating students' creative thinking skills and applying creative thinking strategies to curriculums so that students would have opportunities to use their imagination in order to develop their ability of smooth, flexible, unique, and precise thinking. The teaching principles

include: (1) comprehensiveness: teaching shall cover both cognition and affection; (2) tolerance: teachers shall accept students' different viewpoints and thoughts with an open mind; (3) all-inclusiveness: teaching is not about pursuing perfect logical inference, the non-logical aspect of human minds related to directly perceived senses and affection shall also be considered; (4) difference: teaching shall be able to adapt students' individual differences, consider their creative thinking processes in different phases, and offer them sufficient time to think; and (5) participation: teaching shall be able to develop democratic class atmosphere, facilitating affections of mutual respect and acceptance between teachers and students [3][1].

According to an empirical study, teachers' professional competence and innovation projects supported the adaptive teaching method. If teachers can continuously improve their professional competence, they can see their students' learning interest in teaching activities in a short time. Based on experiences and students' reactions in classes, teaching contents, supplementary information, and teaching goals can be modified timely. Of course, not all teachers can completely accept innovation projects developed by education experts. Different teachers may have different degrees of acceptance due to their personal reasons [3].

Problem based teaching is a student-centered teaching method of providing students a proper situation with a problem to inspire their motivation of learning, achieving pre-set teaching goals through the way of active learning and discovery, and improving teacher-student relationship through interactions between teachers and students. The characteristics of problem based teaching include: (1) combining important problems in the society to teach students meaningfully; (2) cross-disciplinary teaching design; (3) efficient organization daily life of events by teachers to provide students various situations for problem solving; (4) asking students to create various stimulants which are enough to explain or resolve problems; and (5) adopting the cooperative learning method of dividing students into groups to perform and complete various learning jobs and tasks [4].

When a teacher applies the problem-based teaching method, he should ask questions to encourage exploration and interaction. During the teaching process, he should provide his students a structure to facilitate his students' growth in exploration and learning. Unlike traditional teaching methods

which center on teachers, the problem-based teaching method centers on students instead. Teachers can perform in-depth discussions and planning regarding a problem, summarize related teaching resources and materials, and provide students a proper scenario for the problem, to inspire their internal motivation of learning and to achieve expected teaching goals through active learning and exploration, so that the effects of the problem-based teaching method can be maximized [4].

After understanding the implications of the teaching and learning of the innovative product design, the two teachers from two different schools co-directed a student from China face-to-face and through video conferences for this study, to perform, discuss about, and modify the creative design of the new products.

4. DESIGN RESULTS

This study developed two new creative mouse products. The first one is an extra-convenience portable mouse. The inspiration came from how sharks hunt for their foods in the ocean. The mouse itself was designed as a shark, which can bite a laptop and be carried with it, without problems of forgetting to bring the mouse and inconvenience to carry it. The case of the mouse is a metal case with veined patterns. The inside layer is made of soft silica gel. All the structural parts include: a polished surface, a decoration, a signal light, a battery indicator, a rubber pad, a power button, a batter compartment, a batter compartment lid, and a central axis made of metal and covered by acrylic (Figure 1).

The second one is the crystal mouse. It was inspired by the bamboo-made furniture in Taiwan. The amazing transparent acrylic case was made of a durable material. The metal structure inside can be presented to users, resulting in a rich sense of gradation and a strong high-tech design style. Also there is a color program so that users can choose the colors they prefer. The structural parts include: an acrylic grid case with the surface made of brushed stainless steel, a universal track ball, sides made of laser-cut stainless steel, a laser sensor, and a wireless charging board with magnetic adhesion (Figure 2).



Figure 1 Innovative Product Design Results—designed product 1



Figure 2 Innovative Product Design Results—designed product 2

5. CONCLUSIONS

The features of the two new mouse products designed in this study are illustrated below.

5.1. The Design of the Extra-Convenience Mouse

(1)Bionic design: The clip-shaped design is based on the idea of how a shark bites. The design is interesting and creative, with a kind of high-tech aesthetics.

(2)Fancy appearance: The streamlined surface of the mouse is designed of metal quality with texture. The exaggerate design for the sides makes the mouse look very cool. Because the design is based on ergonomics, the convenience to carry is not achieved at the expense of the feel or any function.

(3)Extreme convenience to carry out: The teeth of the mouse are made of soft silica gel, which helps to increase the friction and protect the laptop from being worn down. The solid central axial structure makes the mouse firm. The space of the axial structure is well arranged for the battery compartment, so that the overall size of the mouse can be minimized.

(4)Hand touch: The surface of the mouse contains a one-piece touch panel, which supports multi-touch operations by hand. The touch points for the left and right buttons are hidden between two panels. A middle click can be done by pressing or touching the middle button area. The design is to find the perfect balancing point between new technology and traditional functions.

5.2. The Design of the Crystal Mouse

(1)Aesthetic appearance: The outer case is made of transparent acrylics so that the internal metal structure can be shown, resulting in fancy visual aesthetics and a high-tech design style. The mouse shines under lights, like a fine handiwork.

(2)Detachable design for easy cleaning: The transparent case can be separated easily for cleaning, reducing the possibility of filth or germs left on the mouse. The grid design of the appearance not only is visually aesthetic, but also helps to reduce sweat from user's hand.

(3)Green concept: The wireless charging stand which can be disassembled allows the mouse to be charged automatically. When the mouse is disconnected from the stand, the built-in chargeable battery provides power for at least 3 weeks usage. Compared with traditional mice powered by general batteries, this mouse can greatly reduce environmental pollution.

(4)Suitability for left-hand users: The structural design of the crystal mouse is symmetric, giving consideration to left-hand users.

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