

Discussion on the Content and Form of Homework in the Course of Product Basic Form Design

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Abstract: In this paper, from the perspective of product design major, the form and content of the course assignment of Product Basic Form Design are analyzed and how to set the course assignment in combination with all knowledge points of the course is discussed. At the same time, how to stimulate students' exploration spirit and learning enthusiasm in an interesting and innovative way during the assignment setting process.

1. Characteristics of the Course of Product Basic Form

The basic product form design course is a compulsory basic course for freshmen in art colleges and universities. It is the foundation of follow-up professional courses. The relationship among form, function, structure and materials is discussed in the course, and it is an important link from basic courses to professional courses. Therefore, the basic form design plays a transitional role between basic training and professional design [1], enables learners to apply the basic knowledge of various disciplines in product design through a series of trainings.

2. Organizational Form of Course Assignments

The course of basic product form design is divided into four parts for teaching [2]. During the teaching process of the four parts, the homework contents and forms that meet the content of each knowledge point are designed. The course "Product Basic Form Design" lasts for 5 weeks, with a total of 80 hours. Every 20 hours is the time for knowledge teaching and homework practice of a unit course content.

The specific course contents and homework forms are as follows:

2.1 Discuss the Relationship between Form and Function in Product Design

The content of this course contains the following knowledge points:

The relationship between form and function. The saying that "jade is not as good as earthenware ware" has long proved that ancient Chinese sages have long realized the important value role of using function in the modeling of utensils, and the relationship between product form creation and product function is obvious; The functional value of form fit; Form fit refers to the close cooperation between forms. According to the basic functional requirements of forms, we can find

out the corresponding relationship between forms, so that the created forms fit each other and complement each other, so that their independent forms can form a new unity through form fit design. Achieve the purposes of saving materials and space, facilitating storage, reducing resource investment and expanding functional value. Functional value of morphological combination arrangement. The combination of forms contains the concept of "green design". The interchangeability, compatibility and similarity of elements are emphasized in the element design of form combination arrangement. Through this way of form combination arrangement, the products designed will have the advantages of low cost, material saving and convenient storage and transportation.

Exploring the relationship between form and function is the problem to be solved in this stage of course work [3].

Aiming at this goal, this paper puts forward the following conception of course work content:

2.1.1 Puzzle Design Exercise

This exercise can help students understand the functional value of form fit, which is both interesting and practical. In the process of practice, it is necessary to grasp the relationship between the part and the whole, master the size ratio of each part, achieve the training purpose of form shaping, and further understand the relationship between form and function. In the process of specific production of homework, it is necessary to first select suitable materials. Generally, it is advisable to choose plate or surface materials, such as ABS board, wood board, PVC, etc. These materials should be processed and can be made with tools such as utility knives. In the process of designing, it is necessary to determine the basic theme of the design, and design ideas around the theme content. The jigsaw puzzle design needs to be composed of several parts, the shape of each part needs to be completed under the selected theme, and at the same time, a specific content can be expressed, and the shape of each part needs to have certain internal relations. In the stage of homework, you can create the manuscript paper first, then cut it out. In this process, you can explore the relationship and proportional relationship among various forms, and then use ABS board, wood board and PVC board for processing. In product design, this method of jigsaw puzzle design is widely used, and can be used in the design of jigsaw puzzle children's toys and stationery.

2.1.2 Arrangement and Combination Design (Modular Design)

This design method requires that at least three identical or different three-dimensional basic units should be designed, and then arranged and combined according to the functional requirements. In the process of arrangement and combination, the quantity of the designed basic units can be changed. The quantity change not only expands the functions, but also provides more possibilities for the product form. In the stage of homework implementation and production, students are required to find suitable block materials or plate materials to complete the topic selection. Such as wood block, gypsum block, clay, PVC board, etc., cut and fuse these block materials to make basic units with different shapes. The shapes of these basic units need to follow the principle of shape matching (the requirements of shape matching knowledge points were also assessed in the second assignment). By designing shapes with certain functions, students can realize the relationship between shape and function at the initial stage of design.

Modular design is used in various types of product design, such as furniture design, toy design, lamp design, storage product design, etc. As long as the similarity, interchangeability and compatibility of the units are combined and arranged, products with different functions and different forms can be transformed.

At this stage, the following assignments are arranged: design children's toys by using the form of

arrangement and combination (modular design method). It is required to complete the design of at least three unit pieces with different forms. In the design process, attention should be paid to the fit relationship between forms, and new functions can be expanded and extended on the basis of original functions through arrangement and combination. Gypsum, clay, wood and other materials can be used to make the model. And the plasticity of clay and gypsum is very strong, which is conducive to weighing the overall and local size, proportion, structural relationship and other aspects of the product. Compared with gypsum, clay is richer in color, which accords with the topic selection of children's toy design, and can also weigh the color matching of combination toys. The characteristic of gypsum is that it is more conducive to the characterization of product details.

The operation process is roughly divided into the following processes to complete:

Assume the basic shapes of three toys, and what actual functions are contained in these shapes. By increasing the number and studying the correspondence between each other's shapes, consider how to expand the toy functions and make the shapes have more combination changes. In this process, the toy combination is endowed with fun and creativity.

According to the shape drawn by the sketch, the computer is used to make the model, and at the same time, the size and proportion of each part of the shape can be scrutinized, and the best combination mode of the model can be selected by using computer drawing.

Choose appropriate materials to make modular toy models. If the modular toy design is for young children, it can be made of clay, with rich colors and strong appeal. Creative modular toy design can choose wood and gypsum models, which are more conducive to the production of product structure and details.

2.2 Discuss the relationship between form and material in product design

In this unit course, students are required to master the relationship between form and material, and the assigned homework content also needs to strengthen their understanding of this knowledge point. Material is the material foundation on which human beings depend for survival and development, all the substances outside people's ideology, and also the substances that human beings use to manufacture articles, devices, components, machines or other products. In this course, students need to master the basic classification of materials, the basic performance characteristics of materials, the visual characteristics of materials and so on.

In the setting of homework content, students should first understand the formation of materials and three-dimensional forms, which are inextricably linked with design. As far as product design is concerned, a good design must come from the reasonable selection of materials. When selecting materials, it is necessary not only to realize and meet the requirements of product functions, but also to give full play to the performance characteristics and attributes of materials.

Homework with form and materials: Design the theme paper carving lamp according to the selected topic.

In this assignment, students' understanding of the material characteristics of cardboard is mainly examined. Before making, the use and application fields of cardboard are investigated in detail, and detailed information about its shape needs to be collected. Analyze the basic properties and characteristics of cardboard, and understand its aesthetic characteristics and processing methods. At the same time, the students' ability of morphological processing, such as up-down correspondence, left-right correspondence and so on, is also investigated.

Paper carving lamp originated from paper carving in Han Dynasty in China, also known as paper relief. It is mainly composed of three parts: light source, paper carving and shell. Through the stacking of different layers and the transformation of light, it forms a picture effect with a great sense of space. Before designing and making paper carving lamps, the following related materials

should be prepared in advance: paper, carving knives, glue, etc.

There is no restriction on the topic selection. Students can choose the theme content they are interested in to create. In the early stage of research, they use the camera to take a large number of photos that conform to the theme content. In the later stage, they design and create the main image according to the photos taken. In the design process of paper carving lamps, the main image will be processed by layers. The more layers, the stronger the stereoscopic effect will be in the later stage, and the richer sense of detail will be in the picture level. In the homework, students are required to divide the complete graphic image into at least 9 levels from far to near, so as to ensure the richness of the picture details. Then, the layered images are drawn by hand or by plane software.

The shell shape of the paper carving lamp can be freely created in combination with the theme. In the course, some students selected the topic of paper carving lamp design with Jingdezhen regional cultural characteristics. The vase shape was used as the shell shape of the paper carving lamp, and the plug-in form of three-dimensional structure was used to connect. In the manufacturing process, it is necessary to select cardboard or pvc board with a certain thickness and hardness, and use the thickness and hardness of the board to cut the plug-in interface to make the shell. In the paper carving part, according to the design figures completed in the early stage, the carving knife is used to carve the shapes on sketch paper or Daolin paper. In the later stage, 9 carved pictures are connected with the lamp shell by glue and other tools. At the same time, the LED light source is installed inside the lamp body, so that the paper carving lamp with special light and shadow effect and great morphological characteristics is completed.

2.3 Discuss the relationship between form and structure in product design

Through the study of this unit course, students need to master the relationship between structural strength and material form, structural strength and structural stability, and structural strength and stress direction. At the same time, they also need to master the basic connection methods of materials in structures. Most of the morphological structures in life depend on the connection between materials, and the connection methods of materials directly affect the changes of morphological structures and shapes. In morphological structures, There are too many ways to connect materials. The same material or different materials can have different connection ways, for example, three basic types: "sliding connection", "tenon connection" (hinge connection) and "rigid connection".

In the course, paper materials (corrugated board) are chosen to complete the exercises of shape and structure because of the limited homework hours and the ease of students' processing in the classroom. There are many ways to connect paper materials, such as "bonding", "hooking" and "inserting". The "phase hook" is to use the utility knife to cut out the cuts in the selected positions of the papers to be connected with each other, and then clamp the paper cuts to each other to achieve the purpose of connection. And "insert" is to cut a cut on the corresponding paper, and then insert another paper into the cut, so that it can be embedded with each other without falling off.

After you have mastered the basic connection of materials, you can start the design and production of course assignments.

The course is: Design the seat with corrugated paper as the material. Requirements: It can support the designer's own weight, use the paper taught in the course, and the connection method (hook and insert) of this material is free from nails and adhesives, detachable and aesthetically pleasing. In the selection of corrugated board materials, according to the design scheme, the corrugated board with a maximum length of 1.2m and five layers of thickness of about 6mm can be selected to make it. Students need to consider many factors when designing: how the material-the characteristics of corrugated board, the structure of the chair-can bear the weight of an adult, and at

the same time, the relationship between the material and the structure should be considered, and how to use corrugated board as a paper material through a reasonable load-bearing structure. Besides these, we should also consider the knowledge of ergonomics, such as the depth and width of the seat, the height of the armrest if there is one, and the size of the backrest if there is one.

In the course of this course assignment, theoretical knowledge can be applied to practice. This form can help students to understand the relationship between structure and form more easily. At the same time, through the design and production of course assignment, it can help them to effectively integrate the knowledge content of the early-stage course (such as Ergonomics) and the course of Product Basic Form Design, so as to better cultivate students' practical ability and innovative consciousness.

3. Summary

"Product Basic Form Design" is a basic course for product design major, and it plays a key role in the whole learning process of product design major. Besides the teaching methods and contents, the course's homework forms and contents are also worthy of our in-depth exploration. From this course reform, it can be seen that combining the knowledge contents of each part of the course with interest, innovative homework forms are more likely to stimulate students' active exploration spirit and show their individual talents, which is in line with the purpose of cultivating innovative and applied design talents.

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