Course Design For "Textile Fiber Science" based on Interdisciplinary Integration Teaching Method

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Abstract. Based on the demand for interdisciplinary talents in the modern textile and garment industry, the experimental class of "fiber and fashion design" in our school adopts the mode of interdisciplinary integration. This study taking "Fiber Material Application in Artistic Design" in the "Textile Fiber Science" as an example, the teaching process of three stages before, during and after class was designed. By Chinese traditional handicrafts as the breakthrough point, the potential of its inheritance and development in contemporary textiles was fully explored. It provides interdisciplinary integration reference for professional courses.

Keywords: Interdisciplinary integration, Textile fiber science, Fiber materials, Chinese traditional handicrafts, Artistic design.

1 Introduction

With the rapid development of society, the textile industry has broken through the traditional industry restrictions. It is gradually developed in the direction of high technology and high added value. The high-end competition, national defense and military industry, aerospace and other fields have also put forward higher requirements for textile products. Therefore, it is urgent to break the boundaries of traditional engineering majors. Take industrial demand as the guide to cultivate high-quality compound "new engineering" talents for future textile [1-4]. The most significant feature of "new engineering" is the interdisciplinary integration. Which is an effective way to promote knowledge innovation and disciplines development [5, 6].

Our school (Beijing Institute of Fashion Technology) is a high-level characteristic university with art-engineering integration [7]. In July 2023, the emerging interdisciplinary platform based on "clothing science" of Beijing Institute of Fashion Technology was approved as the first cross-disciplinary platform construction pilots in Beijing [8].

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The "new engineering" experimental class of "fiber and fashion design" is based on materials science and engineering, textile science and engineering, and design. The training mode of "interdisciplinary integration" is adopted, aiming to cultivate compound talents with both engineering background and product design [9].

"Textile Fiber Science" is the subject fundamentals course. The student is a second-year undergraduate student with an engineering background. After study the "Introduction to Fiber & Fashion Design" course, this course aims to learn the structure and properties of textile fibers and master the influence of the structure and properties of textile fibers on the properties of textiles. Observe the artistic design works of textile fibers and understand the role of textile fibers in art design. It is be able to flexibly use fiber for design and application [6]. This paper takes the chapter "Fiber Material Application in Artistic Design" in this course as an example to discuss the method of interdisciplinary integrated education in blended teaching.

2 Course Features & Goals

"Textile Fiber Science" is a required course of subject fundamentals course. It provides a theoretical and practical foundation for students to engage in teaching, scientific research, product design in the textile field in the future. This course consists of three parts: theory, experiment, and design. The main content includes the structure and properties of textile fibers, the identification of textile fibers, and the application of fibers in artistic design (Figure 1). Students can systematically master the structure and properties of textile fiber and identification methods of textile fibers through theoretical study and experimental process. Combined with market research and visiting exhibitions, students will be trained to comprehensively use different fiber for innovation design and development product. The results lead to increase their interest and improve their professional quality, and strive to cultivate and strengthen "interdisciplinary integration" thought pattern of student. Combine the theoretical knowledge of textile fiber structure and performance with the innovative design and development of fiber in products. It is a way to student-centered talent training model.

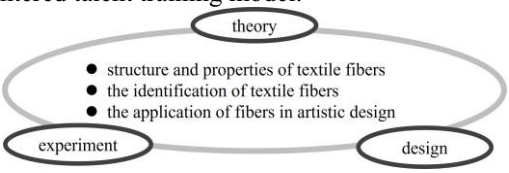

Fig. 1. A course system of "Textile Fiber Science"

In order to strengthen the goal of educating people, the course is values guidance by knowledge imparting and ability training. The teaching content is carefully sorted out one by one, and the teaching documents are carefully designed.

For the teaching objectives of "Fiber Material Application in Artistic Design" chapter in this course, the design is shown in Figure 2. The objective of knowledge is to enable students to understand the historical evolution of fiber art, the relationship between fiber art and contemporary art, the rise of modern fiber art, the development of

fiber art in China. And correctly understand the process and expression of fiber art. It can make the fiber material be reasonably used in the design and production of art products. The objective of ability training is to improve the ability of raise, analyze and solve problems through the analysis of Chinese traditional handicrafts and fiber art works. And enhance the innovation ability and teamwork ability of students through the product design and development of fiber materials in a group. The objective of value is to stimulate feelings of homeland, cultural self-confidence, and enhance cognition of Chinese traditional culture through the learning of theoretical knowledge. Through the product design and development of fiber materials, the self-renewal hematopoietic ability, innovation consciousness, and teamwork consciousness are improved.

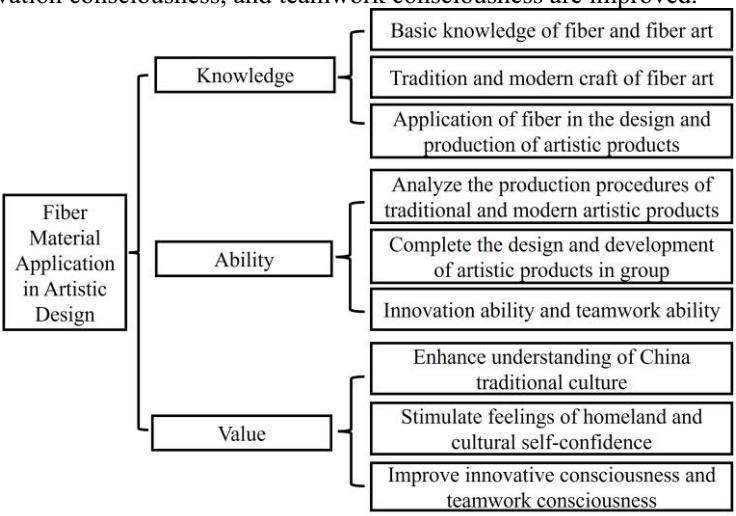

Fig. 2. Teaching objectives of the "Fiber Material Application in Artistic Design" chapter

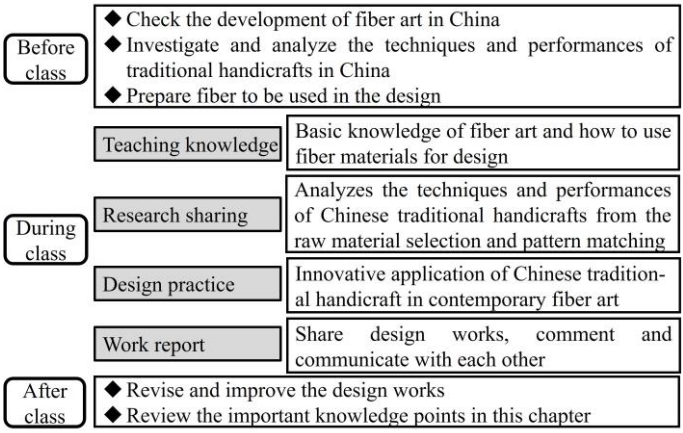

Fig. 3. Teaching design of the "Fiber Material Application in Artistic Design" chapter

3 Teaching Design

In view of the above teaching objectives (figure 2), the teaching design is shown in Figure 3. For the chapter "Fiber Material Application in Artistic Design", a blended teaching mode combining online + offline was designed through the rain classroom and WeChat. The whole teaching process is divided into three parts: before, during and after class. It is mainly based on during-class sessions, supplemented by before-class and after-class sessions. The online course task pushed before and after class is carried out through the rain classroom or WeChat. During class session take advantage of flipped classrooms, the teaching content is a close connection with the artworks design. The flipped classroom is divided into teaching knowledge, research sharing, design practice, and work reporting. Which fully reflects the characteristics of "interdisciplinary integration".

4 Teaching Practice

4.1 Before Class

Push the pre-class learning tasks of this chapter through the rain classroom or WeChat: (1) Check the development and design applications of fiber art, especially in China. (2) Investigate and analyze the techniques and performances of Chinese traditional handicrafts and make a report document. (3) Prepare fiber to be used in the design.

4.2 During Class

(1) Teaching knowledge. The teaching knowledge during the class is carried out from the two perspectives of "art" and "engineering". It is mainly completed in the form of sample display, multimedia courseware explanation, and excellent homework sharing. From the perspective of art, it involves the definition of fiber art, the evolution historical of fiber art, the relationship between fiber art and contemporary art, the rise of modern fiber art, and the development of fiber art in China. From an engineering, it involves the rationality of the selection of fiber materials.

(2) Research sharing. Based on research and analysis of Chinese traditional handicrafts, students are investigations and discusses its potential for inheritance and promote in contemporary textiles. Mainly from the perspective of raw material selection, process realization, pattern color matching and so on.

(3) Design practice. The "innovative application of Chinese traditional handicrafts in contemporary fiber artistic design" is taken as a requirement to carry out product design with the group. It is also required to clarify the design theme, inspiration sources, color extraction, material selection, etc. Students are encouraged to experiment with different fiber and techniques. The natural fibers or chemical fibers can be used. Techniques can include weaving, knitting, embroidery, collage, etc.

(4) Work report. Students upload their own designs to the WeChat. Score and comment on each other among classmates. And select outstanding works for presentation

use the flipped classroom. Teachers make comments and students communicate with each other. The fiber structure, performance and application were strengthened through reporting. A better understanding of how to combined with traditional craftsmanship and fiber materials, to achieve their design expression in modern art works. For example, the work shown in figure 4 is "Optical Fiber Hanging Painting". It is inspired by products using traditional weaving and embroidery techniques within optical fiber and the appearance of sunset reflected on the sea. The work shows the reflection of the sunset on the sea surface through woven with fibers. The glittering part is made of optical fibers to create the effect of "floating light and gold", and the future sense. The picture is more beautiful and layered when combined with wool felt, wool yarns, small beads and small sequins, etc. The organza parts are folded and stacked to give the sense of fluidity with more realism "sea surface".

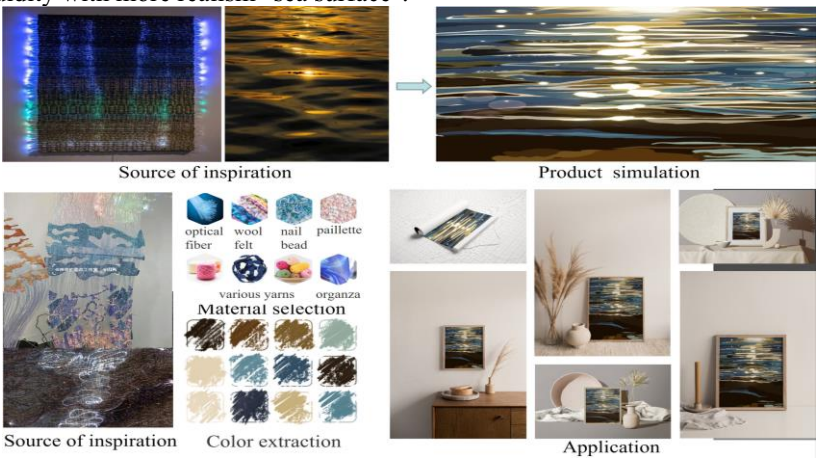

Fig. 4. Student work--"Optical Fiber Hanging Painting"

4.3 After Class

The after-class section, the important knowledge points of this chapter and the key points in the design works that need to be improved are pushed through the rain classroom. Let students review the important knowledge points of this chapter on offline to further consolidate the knowledge. And further improve the design works according to the requirements. Cultivate rigorous and scientific attitude and excellence craftsmanship spirit.

5 Conclusions

The course objective of "Textile Fiber Science" requires that students should be able to design works based on the mastering the theoretical knowledge of fiber materials. In response to the course objectives, the education concept of "interdisciplinary integration" shown in the three stages of pre-class, in-class and after-class. For the chapter " Fiber Material Application in Artistic Design", a blended teaching mode combining

online + offline was designed through the rain classroom and WeChat. Through the cooperation of the three stages, students can better understand and master the knowledge of fiber materials, and be able to apply them in the art design. It has achieved the goal of cultivating interdisciplinary talents.

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