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The Application of CDIO Standard and Computer Assist Instruction in the Design Course of Plain Fabric

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Abstract

Market has an urgent desire to the talent designers of plain fabric. The essay introduces the CDIO (Conceive, Design, Implement and Operate) standard, CAI (Computer Aided Instruction) and establishing the network education platform in plain fabric design course. It uses the theory and practice education model to reform the aspects that it should make an effort to develop the high-quality design talents who adapt to the modern engineering team, new products and the new development demands.

Index Terms: plain fabric; CDIO standard; assisted education

1. Introduction

The plain fabric is a broad heading in textile products. It is widely used in the three fields of clothing, decoration and industry. It has a great desire and yield every year. But at present the whole textile market is weak. In the fierce competitive pressure, enterprises have more attention to the product design. Therefore, it has to put forward higher and updated requirements to the design of plain fabric relatively. And market has an urgent desire to the talent designers of plain fabric.

The fabric design course is a compulsory one in Textile Engineering contained Textile design. It is an introductory course to design product. Teaching theory and methods are the basic of analyzing and designing plain fabric. As a Specialty in Zhejiang Sci-tech University, the fabric design course continuously uses the "combination of art and engineering" Education Mode. It puts great emphasis on nurturing the students' theory and practical capacities. In order to meet the market requirements for design talents, there are many reform attempts in the teaching, such as introducing the CDIO standard and CAI. Through a combination of theory and practice education model, it makes students to grasp fabric CAD technology and various methods of plain fabric design in practice proficiently. it also lays a solid foundation for students in product design in the future.

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2. The application of CDIO standard in the design education of plain fabric

The CDIO standard is short for Conceive, Design, Implement and Operate. It is the concentrated generalization and abstract expression of "Learning in practice" and "Project based education and learning" [1]. This model not only inherited and developed the European and American idea of engineering education reform for more than 20 years, but proposed the systematic capacity-building, implementation guide and the 12 standards of the implemented process and the testing results. It has a strong operability. The model such as the "standard 5: Design- Production Practice", "Standard 9: Strengthen the CDIO capacity of teachers ", "Standard 11: CDIO capacity assessment"[2] and so on has a very good application to the content of courses, testing methods, teacher training, etc in the fabric design course and has a significant reform.

2.1 "standard 5: Design- Production Practice" applicated in the reformation of the fabric design course eduction

The standard requires that Curriculum should include more "Design-Production" practice project [3]. The practice project requires students to start with the concept of design from the conceptual stage, experience the stage of product design and implementation. That it makes students to form an elementary capability that use theoretical knowledge to design product and a capacity of systematic made.

The fabric course has a practical exercise about product weaving. It could use some projects that enterprises have done, some meaningful items that students have free to choose, some items that have social and market value and items from other sources. It could also cooperate with enterprises and use some really needed problems from the enterprises and shooting practice projects to design exercises about product development. If the enterprises believe that the design is available, it is a great encouragement to the students to use their designs. And as this process is more practical, students could learn more practical knowledge.

2.2 "standard 11: CDIO capacity assessment" applicated in the reformation of assessment methods in the fabric design course.

The traditional classroom learning is that teachers evaluate students. The standards focus on the acquisition of knowledge. But the evaluated methods of CDIO standard emphasize on the capacity-building which is the ability-based training model. This model is fundamental different from the subject knowledge-based training. It is a fabric design course that is suitable for putting great emphasis on practice-oriented and the ability to grasp.

The courses could use irregularly and a variety of evaluated methods during the " Design- Production " projects, such as written, oral, inspection records, work competition, and comments on experts in enterprise, etc. It tests students to grasp the ability of professional knowledge and the ability of actual application. While the traditional classroom learning is limited that teachers evaluate students' abilities, this course could also be peer assessment among students and enterprises could give some evaluations based on product reaction in the market. The evaluation process could increase the results of actual reliability and validity and ensure the reliability and effectiveness of capacity test better.

2.3 "standard 9: Strengthen the CDIO capacity of teachers " on the requirements of the abilities of teachers

Currently, most of teachers are from the gate to gate. They have high education background but are lack of practical experience and short of communication and common language with enterprises. Teachers who shoulder the responsibility of helping students to grasp the knowledge and enhance practical ability should set an example of these capacities. Therefore, teachers should first strengthen their capacities, particularly for the professional practical abilities. Teachers should take the initiative to accumulate their own practical experience and improve

their practical abilities. Teachers not only provide students with the appropriate design examples in teaching but become the models of the students.

Teachers need to listen to the voice of enterprises, maintain the communication and interaction with the enterprises, industries and sociality in the fabric teaching. Measures on improving the capabilities of teachers could include: firstly, appropriately introduce the development activities of enterprises in teaching; secondly, cooperate with technical personnel of enterprises in researching and teaching projects; thirdly, use a holiday to corporate training. While teachers accept the practice of corporate training and obtain practical experience, teachers should also invite some technical staffs and designers who had theory and rich experience to the classroom to give lectures, so that students could actually contact the designers of enterprises and learn a shooting designed experience and ability.

3. The application of computer-assisted instruction in the designed education of fabric

Computer-Assisted instruction is the various teaching activities under the computer-assisted. It uses a dialogue way to discuss course content, arranging teaching process and carrying out teaching and training methods and techniques with students.

The fabric design is a very practical course which has an obvious feature of combing textile engineering technology and art. It is closely linked with the fabric color, fabric structure and weaving equipment. Because classroom time is limited, it is difficult that how to make students to receive other relevant knowledge and integrate it into practice, how to make the designed process of textile CAD closely combine with fabric color, fabric structure and the works of textile equipment. If the teaching method is not appropriate, it could easily lead to a mismatch between theory and practice. In order to solve this problem, it is great important to use multimedia modern teaching methods and the practice of designing and weaving. Through multimedia and online teaching and designing and weaving practice, the theoretical teaching is closely linked with the production practice. Therefore, teachers are easy to teach and the students are easy to learn and there is no doubt to get a good teaching result.

The practical teaching course of fabric design is mainly divided into weave design, dobby fabric design and jacquard weaving process according to the needs of training objectives and the corresponding teaching courses [4]. Through the three parts of practice teaching, it makes students to grasp the fabrics textile CAD technology, bridge the course content before and after and easier to understand the content of classroom. It also strengthens students' capacities of design and innovation. The course uses computer-assisted design system to design fabric weave and fabric-aided design in computer-assisted education. Comparison with the traditional design methods, the course highlights the direction and history of technological progress of the textile CAD thus enhances the students grasping and understanding of the textile CAD and inspires the students' innovative thinking.

While establishing the fabric design network course and making reasonable arrangements among sorting and collecting standardized electronic lesson plans, courseware, curriculum, library exercises, test bank, practice teaching library and video information course, etc, It is conducive for students to independent learning. During Courses building, it shows students' videos and photos about doing homework, weaving, folk songs and other activities in the front and many other automated video image data about the work results and classroom. So it will help students to learn happily. It will also help students to interactive learning through building an interactive platform, especially spare time, greatly using of platform to publish information about enterprises, production, fashion, life planning, employment, answer questions to teachers and explore among students.

4. The application of CDIO standard and CAI in the design education of plain fabric

The fabric design course combines the teaching theory with physical design of weaving. The curriculum design based on a team design project makes CDIO standards and computer-assisted instruction be a perfect match in teaching. The project exercise includes market research→market orientation→fabric style analysis→fabric design→fabric weaving→fabrics promotion, etc.

The first part of the project requires students to study from the market and inspect a brand, and then analysis the brand's market position and the style of fabric characteristics that include the direction on color, material, weave, finishing and so on[5]. When learning courses, teachers should explain a variety of basic theoretical knowledge of fabric design including raw materials, linear, process, color, and weave design to nurture the keen fashion sense of students (Fig. 1).

Fig 1. The students' brand style positions and fabric analysis

The second part of the project requires students to seek for appropriate fabric on the market and to turn sample exercises. Then according to the current market trends combined with brand positions, it requires students to innovative design of the fabric and weaves the product (Fig. 2). The stage of theoretical study and project exercises train students to develop creative thinking. According to the need of product, it trains students to design weaves and make the Jacquard weaving process—the machine diagram. According to the need of design combined with popular, it trains students to design patterns such as stripes, lattices and matching patterns. Then it trains students to design a list of process completely and accurately, to complete the calculation of a list of process and process flow, to develop the integrated capabilities of product design through using dobby fabric design CAD (Fig. 3).

Fig 2. Students finding fabrics and weaving fabrics

Fig 3. Students using CAD to design and the product

The third part of the project requires students to use much software to make PPT and recommend the design new fabrics (Fig. 4). On the whole process, students should record pictures and videos and make the team project exercise into a record video. And the third part also trains students to develop team spirit through the process, the selling ability to products and ideas, to have a team spirit, communication skills that are for the survival and growth under the modern engineering environment and the control awareness and ability of new products, new processes and new systems [6].

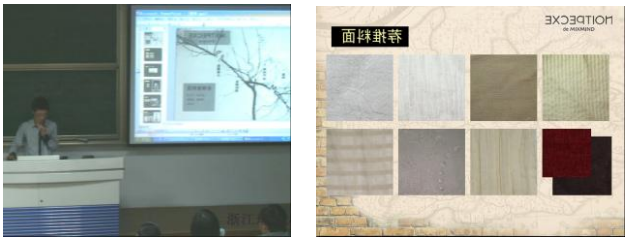

Fig 4. Students recommending the new fabrics and the courseware

When students are studying, they could extend learning, upload information, pictures and video through network education platform, timely discuss the details of the process and share information and the process emotions with teachers and students. In the whole process, it makes students to systematically grasp knowledge of all links in the fabric design which contain weave design, capture trends, factors about product affecting and design features of various types of fabric products and the key technology, the calculation of process parameters, the matching color of warp and latitude and the series design of matching products. At the same time, it also enables students to learn many things outside of technology such as management, market, communicating with customers and service, cost, financing, team cooperation, etc.

5. Summary

Through more, faster, better absorbing, using the advanced or characteristic education methods and techniques of other countries and using abundant information on networks and computers, we not only make students to grasp and use expertise, but also develop the integrated capabilities of students in the process of teaching. And we make students have to a solid foundation of professional knowledge, good communication and expression skills, team spirit, good packaging and salesmanship of self-awareness and have a strong sense of innovation and then make students to become the high-quality design talents who adapt to modern textile engineering team, new products and the new development demands.

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