Intelligent Production-based Garment Technology Course Reform

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ABSTRACT
In the era of increasing mature industrial production, clothing enterprises have begun to transform to the direction of intelligent manufacturing. Enterprises tend to choose semi-automatic or fully automatic equipment to improve production efficiency. However, the garment technology course in colleges and universities still follows the mode of individual cutting and making. This makes it difficult for students to adapt to the production mode of enterprises after graduation. Thus, the reform of the garment technology course is imminent. Aiming at the problem of how to cultivate application-oriented professional and technical personnel, this paper analyzed the problems existing in the garment technology courses in colleges and universities and the causes of the problems and put forward course reform suggestions, hoping to promote the teaching development of garment technology course in colleges and universities.

Keywords: *garment technology course, teaching reform, intelligent production, professional technology*

1. INTRODUCTION

In the 14th Five-year Plan period, the garment industry in China is facing a new round of scientific and technological revolution and industrial transformation. The integration of information technology and manufacturing industry has become increasingly evident. The proposals of "Made in China 2025", "Industrial Internet in the United States", "Industry 4.0 of Germany" have further promoted the development of modern enterprise production towards a highly automated and intelligent direction. With the maturity of device manufacturing, a great many automatic sewing equipment have been adopted in front-line production, and even many small and medium-sized enterprises have completed the transformation from labor-intensive to technology-intensive.

However, in colleges and universities, the garment technology course mainly focus on the traditional craft learning and takes the traditional clothing industry mode as the basic form. This is seriously out of step with the modern enterprise production mode, leading to the fact that students are unable to work directly after graduation. Although many colleges and universities have realized the importance of course reform, garment industry course reform is still facing many difficulties due to a variety of factors. According to the statistics of the labor department, garment enterprises are facing the "shortage of workers" at the present stage, and there are some garment enterprises that are on the verge of suspending production because of the lack of front-line workers and technical personnel.

Therefore, colleges and universities should pay more attention to social needs when cultivating students majoring in clothing. For example, a teaching link simulating the intelligent "assembly line" of enterprises can be added to the course. This measure can help students apply the knowledge learned in class to the production process of enterprises through practice, so that students can master the process of garment manufacturing and understand the significance of learning garment technology. This can also provide students with more opportunities to contact industrial production equipment, so that students can better understand the work content of front-line technicians in enterprises. In a word, students can complete the transformation from theoretical knowledge to practical skill in school, and schools can provide enterprises with skilled professionals who can work immediately without additional training.

2. PROBLEMS EXISTING IN COLLEGE GARMENT TECHNOLOGY COURSE

2.1. The training objectives are conservative.

On one hand, training objectives are set uniformly when students are enrolled. On the other hand, the school learning cycle is long, and the production technology and the fashion trend of the garment industry changes rapidly. As a result, the knowledge students learned in school lag behind the development of the garment industry, which is an important reason why students cannot directly participate in the production of enterprises after graduation. Garment technology is a course that combines theory and practice in garment major. Its teaching objective is to cultivate students' hands-on ability, master the basic knowledge and skills of garment sewing, and understand the method of garment production. If the skills students learned have been eliminated, there will be no significance to learn it[1].

2.2. There is deviation between teaching material and enterprise technology.

Nowadays, the compiling personnel of garment technology teaching materials are mostly college teachers, who are generally engaged in teaching and academic research and seldom participate in the production of enterprises. Due to the need of advancement, enterprises have to continue to research and develop to improve their technical level, so the craft, process and equipment in the clothing industry are updating very quickly. At the same time, with profit as the core goal, garment manufacturing enterprises do not have strong motivation and willingness to participate in the compilation of technological teaching materials. This leads to the technological disconnection between the technology learned by students from the existing teaching materials and the general technology used in enterprises.

2.3. The teaching equipment is backward.

Garment production enterprises are experiencing the baptism of intelligent industrial development, a lot of the traditional process has been replaced by machines. Although colleges and universities have a funds to purchase equipment, equipment procurement need to consider many factors such as application cycle and universal applicability. As a result, colleges and universities cannot buy and sell equipment as flexibly as enterprises, and students can only get access to the most basic processing equipment in campus. Modern intelligent equipment is very different from traditional equipment. Just teaching students complicated traditional craft skills is prone to discourage student and mislead them about the work content of first-line technical personnel in enterprise[2] .In fact, with the innovation of modern production technology, the work content of first-line technical personnel has changed drastically.

For example, the manual welt pocket making process using traditional sewing machine equipment can be divided into the following procedures: fabric cutting, positioning, ironing the adhesive lining, preparing the thread embedding cloth, drawing the bag position line, sewing the pocket mouth line, front opening, folding ironing, hand sewing of the fixed inlay line, sewing the pocket cloth and packing the cushion cloth.

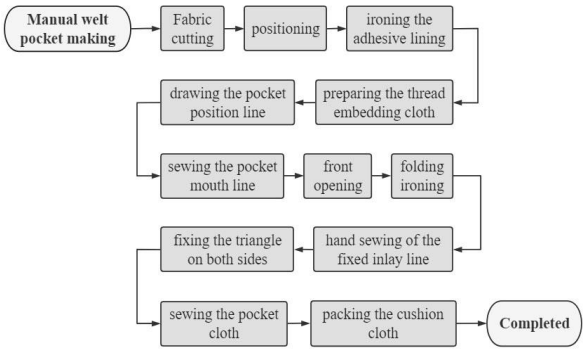

Figure 1 Comparison of manual welt pocket making process

Moreover, welt pocket making requires high technological level. Even very skilled technicians should slow down and make it carefully to ensure that the width of pocket inlay line is consistent and beautiful. In contrast, it is different to use the automatic welt pocket machine to make a pocket, which only needs a skilled worker to complete the perfect process with a few simple steps (Figure 1). Intelligent equipment has been rapidly popularized in enterprises because of its simple operation and steady process level[3] .

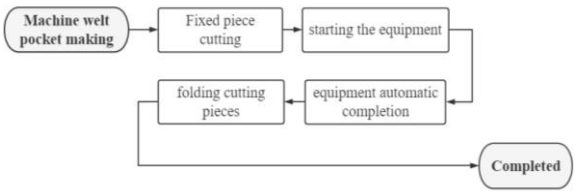

Figure 2 Machine welt pocket making process

2.4. The design of teaching links is not scientific enough.

Now colleges and universities have noticed the disconnect between school learning and the requirements of enterprises, so they are actively arranging students to participate in corporate internships. [4]However, the internship can only help students understand the work content of the enterprise but cannot fundamentally solve the contradiction.

Although many enterprises accept students for internship, they generally do not arrange students in the front-line production to avoid affecting the production schedule of the enterprise. Therefore, students cannot reach the expensive intelligent equipment.

Therefore, balancing the interests between school training and enterprise production and making students truly participate in enterprise practice become an urgent problem[5]. This problem requires school to improve the teaching link and optimize the cooperation mode between school and enterprise, by which students' internship can really become a bridge between school and enterprise.

2.5. Teachers lack enterprise experience.

Teachers are important participators in teaching activity, and teachers' teaching ability directly affects students' learning quality. Practice is the core of garment technology course. However, most teachers come from professional colleges and universities and become teachers directly after graduation without working experience in enterprise. Teachers with enterprise experience also suffer from disconnection with enterprise production as they have worked in schools for a long time. Due to the lack of understanding of the production process, technical means and process requirements of the enterprise, teachers can use the textbook only to teach students, which leads to the failure to connect with the actual production of the enterprise in the teaching process, thus affecting the teaching effect.

2.6. Students are not very interested.

With the upgrading of garment equipment and technology, a large number of skill-oriented and application-oriented talents in garment industry are needed. However, at present, the content of clothing public welfare courses are relatively simple, which can not stimulate students' learning enthusiasm. Most students majoring in fashion design dream to become fashion designers rather than craftsmen after graduation. [6]In addition, students' one-sided view believes that the work content of craftsmen is just simple and boring mechanical sewing, and they are unwilling to devote themselves to front-line work, resulting in the current situation of technical talents shortage in enterprises.

3. SUGGESTIONS ON GARMENT TECHNOLOGY COURSE REFORM

3.1. Adjusting major settings and training targeted intelligent technical personnel

Schools undertake the responsibility of cultivating talents needed by the society. It is not appropriate to simply throw students to practice whenever students cannot adapt to the production of enterprises. Schools should deal with the issue from the perspective of its own major setting. Minjiang University, for example, has taken the lead in reform and set up a garment intelligent manufacturing innovation class in 2021. The establishment of this class aimed to select and cultivate high-quality application-oriented garment professionals that can meet the needs of modern intelligent garment manufacturing and can solve complex engineering and technical problems in the process of garment manufacturing. These garment professionals should be equipped with multi-disciplinary knowledge structure as well as the innovative ability and international vision.

3.2. Drawing lessons from enterprise experience and updating teaching materials regularly.

Textbook publishing needs a certain period, while technology is constantly innovating. This leads to a certain disconnection between existing textbooks and advanced technology. At the same time, many enterprises are reluctant to share their advanced technology in order to protect their own interests. Therefore, on the one hand, schools should actively cooperate with enterprises, learn cutting-edge technology of the industry, and timely share with students; on the other hand, schools should not rely too much on enterprises. Schools should organize a forward-looking team of teachers and researchers and strive to drive the transformation of enterprise production technology with the achievements of campus research fruits.

3.3. Cooperating with enterprises and updating equipment regularly

In garment technology course, it is necessary to learn how to use traditional equipment, but it is also indispensable to show the convenience of new equipment to students. This can make students really understand enterprise production, so that students will not be discouraged from garment production because of complicated technology. However, restricted by the university system and funds, the school teaching equipment have the characteristics of old model, lack of variety, and insufficient quantity, which leads to various restrictions in students' learning process. Faced with such difficulties, schools should seek cooperation with enterprises to regularly update school equipment. For the equipment with low utilization rate, the methods of video explanation, physical visit and corporate sponsorship can be adopted to expand students' horizons. Taking the popular flexible manufacturing system (FMS) and manufacturing execution system (MES) as examples, it is unrealistic for schools to purchase such equipment used in production line

directly. Nonetheless, teachers can help students learn and make up for the lack of school equipment by leading students to visit the enterprise or inviting enterprise teachers to present in school.

3.4. Optimizing course design and arranging course structure scientifically.

At present, the garment technology course in colleges and universities mainly focus on learning traditional sewing methods. Due to the great difference between intelligent production mode and traditional sewing mode, students cannot apply the clothing craft knowledge they have learned in school to the production of enterprises[7].Therefore, it is suggested that teachers integrate the operation method of enterprise intelligent equipment into the course and add the simulation of intelligent assembly line production mode. Teachers can let students choose posts by drawing lots, and conduct post assessment on students through simulation operation (Figure 2), so as to help students connect the knowledge learned from school with practice.[8]

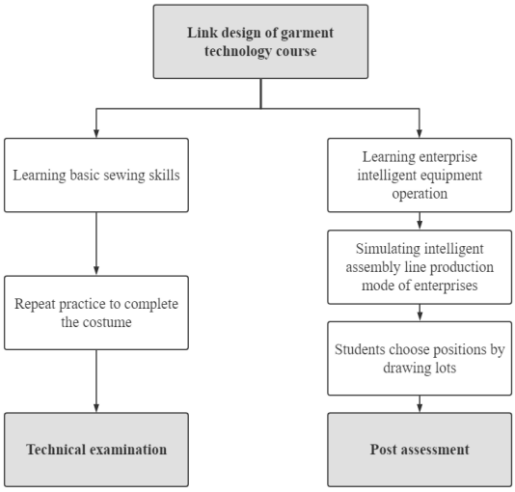

Figure 3 Link design of garment technology course

3.5. Strengthening construction of teacher team and making students adapt to new industrial mode.

The training plans for teachers should be formulated and the construction of teacher team should be strengthened. [9]Leaders of colleges and universities can organize teachers to learn the operation of advanced garment technology in enterprises, and they can also hire technical personnel in enterprises to guide teaching. Enterprise technical personnel can be invited to participate in classroom teaching and textbook compilation, and the experience brought by them should be valued. Through continuous communication, the classroom teaching in school can be more closely combined with the actual production of enterprises, and the organic connection between school teaching and enterprise production can be promoted (Figure 3).

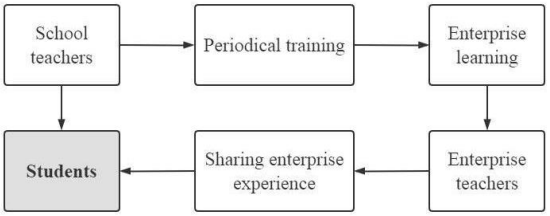

Figure 4 Teacher team construction mode

3.6. Paying attention to professional ideological education and cultivating students into skilled talents.

In modern society, the social status of skilled workers is rising day by day, but many college students are still unwilling to devote themselves to front-line technical posts after graduation. It is necessary for schools to actively change their ideas and establish a correct view of career choice. Upgrading traditional industries is an important task to promote high-quality development of manufacturing and build China into a manufacturing powerhouse. As an important livelihood industry and traditional industry, China's garment industry has a solid industrial foundation, a perfect industrial system, and a huge clothing consumption market. Therefore, the transformation of the production mode of garment enterprises is the general trend. Under such circumstances, a large number of professional and skilled talents are needed to join the industry. Schools and teachers should help students accurately understand their own advantages and disadvantages, adjust the relationship between supply and demand of employment, and provide necessary help for students' employment.

4. CONCLUSION

Garment technology is a course that combines theory with practice, and its improvement needs the efforts of multi aspects. The teaching reform of the garment technology course is a comprehensive project that needs the cooperation of many parties. The reform requires not only the strong support of the school, but also the participation of the garment production enterprises.[10] Through the teaching reform of garment technology course, the resource sharing between schools and enterprises in professional equipment, technology and talents can be realized, the teaching quality of colleges and universities can be improved effectively, students' professional level can be enhanced significantly, and students can enter society successfully.

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