Systematic Development of Project Curriculum and Practical Study of Informatization Teaching in Higher Vocational Colleges

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Keywords: Vocational education, Project curriculum, Informatization, Teaching practice, Curriculum development.

Abstract. The project course "Product Development and Process Design of New Type Yarn" of modern textile technology specialty in higher vocational colleges was selected for systematic development. Constructed of online and offline "multidimensional" teaching resources, mainly includes course project teaching materials, course website, course official WeChat accounts, etc., and constructed the high-quality on-campus training places. Investigate the change of students' learning style and try to carry out practical research on informationization teaching. After the reform, the students' professional skills have been greatly improved and the teaching effect is remarkable.

Introduction

Along with the rapid development and upgrade of the intelligent terminal equipment and network communication system, the world has formally entered the Internet era, the younger generation is accustomed to use mobile phones, computers and other intelligent terminals to shopping, share experiences and exchange knowledge, forcing education researchers to break the traditional teaching mode, use modern network and communication technology, to research the new teaching mode under the background of network times, the development the curriculum resources which can adapt to the new requirements.

As a textile higher vocational education teaching researchers, on the one hand, higher vocational project curriculum cultivate practical job skills and quality as the goal, there is a big difference with traditional theory teaching, just a little theoretical knowledge learning, more need of practical training, be badly in need of develop the reasonable and effective informationization teaching resources; On the other hand, facing the upgrade of textile industry, the demands of professional talents and technology talents were changed, how to promote the training of professional technical talents with excellent quality in higher vocational colleges, and how to promote the continuous communication and learning of these talents in their career is a subject we need to pay close attention to. The goal of course team is to cultivate high-quality and skilled talents for the development of new products in higher vocational colleges, developed new textile vocational education field course "Product Development and Process Design of New Type Yarn", and carried on the systematic course design, information resources construction and teaching practice research.

General Situation of the Course

Development Background of the Course

With the rapid development of social economy, the bottleneck of the development of China's textile enterprises is gradually emerging. The labor-intensive advantage that China's textile industry has been relying on for a long time is rapidly fading. The high progress of textile machinery and technology makes the textile workshop gradually enter a new era of "dustless, unmanned ". With the continuous improvement of people's living standards in China, higher requirements have been
put forward for textile products. Middle and low-end textile products that occupy the dominant position in the market are being replaced by middle and high-end products. In such an age of advocating science and technology and innovation, the cultivation of textile talents has created new demands. Therefore, it is one of the new targets of education in the modern textile industry to cultivate high quality and skilled talents who are familiar with basic spinning theory, skilled in spinning wheel operation, skilled in spinning process design and brave in developing new type yarn products.

**Basic Information of the Course**

Basic information about the course can be seen in table 1.

**Table 1. Basic information of the course.**

<table>
<thead>
<tr>
<th>Course name: Product Development and Process Design of New Type Yarn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course code: FZ1045B</td>
</tr>
<tr>
<td>Teaching time: term 4</td>
</tr>
<tr>
<td>Course type: compulsory course for modern textile technology major, core course for major</td>
</tr>
<tr>
<td>Follow-up courses: Graduation Design or Thesis, Graduation Practice</td>
</tr>
</tbody>
</table>

Situation of the students: After the advanced curriculum is opened, the students have mastered the operation skills of every process of spinning, be familiar with the spinning machinery and principle, and have the ability of technological design, calculation and quality control of common varieties of yarns (such as pure cotton combing yarn, cotton blended combing yarn, core-spun yarn, etc.). Students love hands-on courses, especially project-oriented courses aimed at completing products.

**Systematic Development of Course Content**

**Development Idea of the Course**

To serve the local spinning enterprise development for the purpose, based on enterprise professional post demand survey, with professional post ability as the guidance, on the basis of cooperating with domestic spinning enterprise, adopt the curriculum content design ideas of "based on the working process", analysis the professional post responsibilities, to refine the typical work tasks, the project as a carrier and task driven, adopt "learning by doing" integration of teaching model, build the teaching quality guarantee system which participated by the school and the enterprise, and construct online and offline multidimensional teaching resources, cooperate with modern teaching methods and means, train high quality and skilled talents for new product development and process design in spinning industry.

**The Core Competence Cultivated in the Course**

Courses team members researched in Jiangsu province spinning enterprise, to understand the enterprise present situation and the professional post demand, and invited textile industry practice experts to held a thorough discussion, product development and process design of production post group in the spinning mill is analyzed, based on the students' employment after career development course, from three aspects: operational, technical and management, yarn product development and process design related work can be divided into 19 jobs, and divided the technical level jobs and job responsibilities which the course focuses on in detail, the technological level is divided into 7 jobs, 26 job responsibilities, 36 typical tasks. The main jobs for this course are product developers and technologists, secondary positions include raw material selection and distribution personnel, quality personnel, dispatch personnel, etc. The positions that can be further developed in the future include production supervisor, R&D supervisor, quality supervisor, etc.
Construction of Course Content

Course mainly includes four projects: the understanding and analysis of the new type yarn, development and design of ordered yarn, development and design of market popular yarn and development and design of innovative yarn[1]. As shown in Fig.1. The content of the project chooses the typical cases form enterprises, combining the advanced textile technology, product design technology, and the cultivation of innovation ability according to the enterprise actual operation situation, analyze the way of developing new yarn product layer by layer. Course content refined from the practical production operation of new product research and development, the system completely presents the content system structure of the new yarn product development, the four teaching situations are carried on step by step, the project set fairly reflect the enterprise's core technical requirements, with specific project tasks as the carrier, fast effective guidance to the novice.

Teaching Quality Assurance System of the Course

Introduce standards for enterprise talent requirements, construct differentiation standard system, build the multi-level monitoring and evaluation mechanism by the supervision, students, teachers and enterprise experts. Establish a four-level supervision system by college, secondary college, departments and teaching & research offices. A multi-level student sample supervision and evaluation mechanism including teaching information staff, outstanding student representatives and student subjects is established. Construct a dynamic virtuous cycle system of improving teaching quality. A more reasonable and effective monitoring and evaluation feedback mechanism should be established, to correctly motivate and guide teaching activities, so that the teaching quality can be raised step by step[2].

![Figure 1. Construction of the main content of the course.](image)

The course assessment is in accordance with the general requirements of " all-sided assessment and comprehensive evaluation", including formative assessment and final assessment, emphasizing students' mastery of basic theories and paying more attention to the cultivation of students' professional skills and individual qualities. The assessment program is divided into three parts: usual performance (25%), project performance (50%) and theoretical performance (25%). The usual performance takes into account the students' basic quality, the project performance takes into account the students' professional and technical skills, and the theoretical written test performance takes into account the students' theoretical knowledge.

Online and Offline, Construction of "Multidimensional" Teaching Resources

Develop course software and hardware resources, construct teaching materials, course website and official WeChat accounts, and construct the campus spinning practice factory. From convenient implementation class (paper, no interaction distance), convenient personal PC (computer) use and convenient personal portable electronic devices (mobile phone, pad, etc.) using the "online and offline" multidimensional teaching resources to service students' learning, as shown in Fig.2, students can access to learning resources at any time and place conveniently, also can according to the course arrangement, individual schedules, individual hobby etc. to choose learning methods.
The Construction of Teaching Material Which Can "Guide to do, Guide to Learn"

According to the task requirements of the project, the teaching materials (as shown in Fig. 3) and assignment book of “guide to do and guide to learn” should be constructed to ensure the smooth implementation of "learning by doing"[3]. The targeted teaching materials "Development and Innovative Design of New Yarn Products" was constructed and published, which was approved by ministry level planning teaching materials of the 13th five-year plan and key teaching materials of Jiangsu colleges and universities.

Construction of Course Website

The course website is constructed by using the "nclass" and the campus course learning platform, and the content includes course introduction, course team, course resources, teaching organization and other modules, among which the course resources include courseware, teaching plan, video, picture and text, problem set, test set, student work set, related literature and other fragmented resources. Students can log on to the course website to view and download learning materials, they also can discuss and communicate with teachers and students in real time on the website. The course website is shown in Fig.4.

The Construction of Official WeChat Accounts

WeChat is another instant messaging software that has been fully developed in China after Tencent QQ. Since its entry into the market in 2011, it has only taken five years to develop over 94 percent of the country's smartphone users. WeChat can quickly send free voice messages, video, pictures and texts via the Internet, and it was so easily to use. Since 2015, official WeChat accounts has been built for the course[4]. Considering the particularity of the course and the performance of WeChat public account, push messages are divided into 4 to 5 modules: task layout, pre-class homework, reference materials, safety matters and knowledge development. See Fig.5. WeChat public account can regularly sent learning tasks, task tips or cases, relevant learning materials and other learning resources in the learning stage.

The Construction of Hardware Facilities

The college has built one National Textile and Apparel Training Base, one Ecological Research and
Development Center of Jiangsu Province, one Cloud Testing Center of Jiangsu Province, and has advanced spinning equipment and related fiber and yarn performance testing equipment. It provides sufficient hardware guarantee for the course development.

Figure 5. Official WeChat accounts of the Course.  
Figure 6. Hardware facilities.

The Reformation of Informatization Teaching

Research on Students' Learning Style in the Information Age

The course group tried to carry out "blending learning", conducting research on the learning needs of more than 380 students in the college in advance, so as to fully understand the learning needs of students and formulate reasonable information teaching contents and methods. The research content mainly involves the confusion in the study of professional courses, the preference of network media, the form of course resources and so on.

In learning the confused survey, 47.4% of the students thought that in the course of the project lacks the teacher one-on-one instruction, while 84.2% of students thought that after the course it is easily to forget the relevant knowledge and skills, this suggests that the course of network learning platform construction is very necessary, not only can help students to better grasp the learning content in the process of curriculum implementation, but also provides a sustainable learning platform.

In network media preference survey, 71.6% of the students can accept course website, and accept the WeChat or official WeChat accounts students was 100%, only 21.05% of the students chose QQ, 10.5% chose the other network media, such as the microblogging. Check the learning content on mobile phone undoubtedly become the most economic convenient online learning way, in addition, the course website which can accommodate a large number of curriculum resources also be valued by students.

In curriculum resources survey, 89.5% of the students think should provide electronic textbooks, video, PPT and other forms of curriculum resources, 55.3% of the students think should provide chapter exercises and simulated test, 63.2% of the students think should provide data download zone, while only 28.9% of the students support the discussion area.

Based on the research results of comprehensive learning needs, two kinds of network media, "course website" and "course official WeChat accounts", were selected to implant the classroom teaching, the flipped classroom and the "blending learning" teaching practice research was carried out.
Practical Research on Flipped Classroom

Course official WeChat accounts provides the ideal technical support to flipped class, teachers can integrate micro lessons, text, images, and other forms of resource, and then pushed to students through the course official WeChat accounts, students only need to install WeChat APP in the mobile phone, and add course official WeChat accounts for attention, and then can receive the learning resources sent by the teacher.

In "Product Development and Process Design of New Type Yarn" course teaching, The course group tried to adopt the teaching mode of "flipped classroom" in the teaching links such as product design, process optimization (formulation of experimental scheme), students learn micro lessons pushed by teachers, to complete corresponding homework, communicate and discuss with each other in class, the teacher explained the important and difficult. The vast majority of students can actively cooperate with teachers, complete the learning tasks well, and effectively solve the phenomenon of "bowing down" in the theoretical learning class of this course. However, the implementation effect of flipped classroom among students in higher vocational colleges is closely related to teachers’ correct guidance and management supervision. In addition, considering the safety issues and teaching effectiveness, the "flipped classroom" is not recommended in the teaching links that are inclined to practical operation[5].

Practical Research on Blending Learning

After a lot of efforts, the course group successfully applied the course website and official WeChat accounts to the course of "Product Development and Process Design of New Type Yarn ", and continued to carry out the blending learning practice. The study found that the blending learning effectively improved the students' learning interest, to some extent, improved the quality of teaching, has strong promotion value, but this kind of teaching mode in the present project of the course teaching effectiveness is still influenced by some factors, such as the smoothness of online media, the quality of course fragmentation resources, campus network environment, students' learning initiative and monitoring strategy and so on. The effective implementation of the blending learning requires the vocational education teaching researchers and related functional departments to work together, continuously pay attention to and follow up[6].

In addition, the course team also tried to use teaching apps such as Mosoteach and Rainclassroom to effectively present the fragmented teaching resources to students, and achieved good teaching results. The course informationization teaching reform in higher vocational colleges is an innovation in the race with science and technology.

Summary

The project course "Product Development and Process Design of New Type Yarn" of modern textile technology specialty in higher vocational colleges was selected for systematic development. Has constructed the high quality "multidimensional" teaching resources, investigated the changes of students' learning methods, and try to carry out the practice research of informatization teaching. Through the reform, students' professional knowledge and skills have been greatly improved, and the course work has a significant advantage over the previous students.

(1) This course is a typical project course in higher vocational colleges, and it is also a core professional course. The course development takes three practical typical product projects of enterprises as the main line to cultivate students' post ability layer by layer, which effectively stimulates students' interest and enthusiasm in learning and meets the learning needs of contemporary higher vocational students.

(2) Under the background of the Internet era, the learning mode of students has changed, and they can quickly master the use methods and skills from online media. Compared with the traditional paper teaching materials and documents, they are more willing to obtain the course learning resources from WeChat, website and other online media anytime and anywhere.

(3) Online learning resources are available to students through the course website and official
WeChat accounts, among them, the WeChat platform mainly provides real-time information of the course, including the content summary, main reference materials, assignment, etc. The course website provides a more comprehensive and systematic learning resource for the course. In this way, the multidimensional teaching resources for students are constructed.

(4) Whether it is the course website or official WeChat accounts, the teaching resources to be published must be clear and understandable in the framework design, so that learners can see at a glance and find the learning resources they want quickly. In particular, the official WeChat accounts must push the learning resources regularly, and the resource mode is fixed and the pushing time is fixed. Students can better control their study and life time, and form good study habits, and get the learning tasks assigned by teachers as soon as possible, consult reference materials and complete them.

(5) Network media plays a good role of "assistant teaching" in higher vocational project courses, the learning resources of network media can be applied in the classroom with the "flipped classroom" and "blending learning" teaching mode. However, due consideration should be given to the characteristics of teaching content, teaching design should be done well and teaching effects should be ensured. We should not blindly exaggerate the importance of online learning resources, or rely too much on online learning resources and ignore the main role of classroom teaching.

Acknowledgements

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Research direction: textile new product development and related teaching research.
Fund program:
1. Top-notch Academic Programs Project of Jiangsu Higher Education Institutions (PPZY2015C254)
2. Qinglan Project of Educational Department of Jiangsu Province, China [No. Education Department of Jiangsu Province (2017)15]
3. Modern Education Technology Research Topic of Jiangsu Province (2017-R-57077)
4. Advanced Study and Train and Practice for Young Teachers of Vocational College of Jiangsu Province, China (2018TDFY009)

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