Research and Application of Teaching Model on Mechatronics Technology Major with the Orientation for Student’s Employment

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Abstract: Based on analyzing the disadvantages of traditional "three-stage" teaching model, as well as analyzing training goal of mechatronics technology major of Jiangsu Open University, combined with successful experience of similar colleges, put forward the teaching model on mechatronics technology major of our university, which is combining learning with practice, work-integrated learning. Point out that building the training center and training base of our major is fundamental guarantee for implementing teaching model of “combining learning with practice, work-integrated learning”.

Introduction

For higher vocational education, in order to meet the requirements of talents for employment and improve the quality of school running, we must pay attention to the research of teaching mode. In making talent training scheme of mechatronics technology major, Jiangsu Open University rejected traditional "three-stage" teaching model, established teaching mode of “work-integrated learning, combining learning with practice” which accords with the characteristics of higher occupation education, and achieved good results.

The Disadvantages of Traditional "Three-Stage" Teaching Model [1]

In the past, many universities and higher vocational colleges adopted traditional "three-stage" teaching model.

The so-called "three-stage" teaching model is that in the first year, students studies public courses, they do specialized core courses in the second year, and in the third and fourth year, they do professional courses.

One of the disadvantages of this model is that academic and theoretical curriculum proportion is relatively heavy, and practical and skills curriculum proportion is seriously deficient. The courses of real occupation kill accounted for only 1/3 of the study time, and this time is difficult to guarantee. This is mainly because the real skill and practice courses are often placed in the third year, and this year due to graduation and employment problems, they go out to find a job.

In addition, from teaching methods, the students sat in the classroom, the teachers have been lecturing all time. This kind of teaching method is difficult to give full play to the initiative, enthusiasm, innovation and practice of students' learning. Moreover, from the examination, written examination is the main form of the examination. This approach makes it difficult to correct evaluation of a student's occupation skill level. More importantly, it provides students with a wrong idea, that is, rote learning knowledge is the most important way to learn.

In a word, the "three stages" teaching model cannot meet the requirements of higher vocational education for personnel training, so it must be reformed.

Determining Teaching Model with Training Objective

The determination of teaching model must be based on the training target of this major.

In "ministry of education on the work opinion on strengthening the talent training in higher vocational education” describes the training objectives of higher vocational education as follows[2]: It is a fundamental task to train higher technical applied talents; To adapt to the needs of society as
the goal, to develop technology application ability as the main line design students' knowledge, ability and quality structure and training plans; Graduates should have the characteristics of proper basic theory knowledge, strong practical ability, wide knowledge, high quality etc.

In order to achieve the training objectives, in the talent training scheme on mechatronics technology major of Jiangsu Open University pointed out that the major, mainly for the need of manufacturing informatization, intelligent application, will train higher technology applied specialty personnel who are all-round development in moral education, intellectual education, physical education and aesthetic education, have basic theory and professional knowledge, master technology and skills of equipment installation, commissioning, operation, maintenance and management, adapt to the development of modern mechatronics industry, have certain innovation ability. That is to say, graduates of mechatronics technology major should not only understand professional basic theory and knowledge, but also should have the production operation ability in these positions, will be good at technical intentions or engineering drawings into physical entities, to solve the practical problems in the production [3].

**Teaching Model of Combining Learning with Practice, Work-integrated Learning**

Based on analyzing the disadvantages of traditional "three-stage" teaching model , as well as analyzing training goal of mechatronics technology major of Jiangsu Open University, combined with successful experience of similar colleges, put forward the teaching model on mechatronics technology major of our university, which is combining learning with practice, work-integrated learning.

**Teaching Model of Combining Learning with Practice**

**The Core of the Teaching Mode on Combining Learning with Practice.** At present, employment market and economic development of China are facing two big changes: with the market competition, requires a lot of social labor skilled force; optimize and upgrade of the industrial structure need to cultivate more high skilled talents. The main force of developing these labors and talents is the higher occupation technical college.

The teaching mode on combining learning with practice is one of the more appropriate method of cultivating these labors and talents. Its core is to apply the theory into the practice to solve problems of the "what do you do" and "how to do you do", to make students be able to use it, as soon as possible to adapt to the actual working environment.

**The Connotation of the Teaching Model on Combining Learning with Practice [4].** The concrete method of combining learning with practice is that the classroom is placed in training center, or the training center is placed in the classroom, so that the classroom and training center are put together, the theory teaching and skill operation are put together. Its advantage lies in the integration of theory teaching and practice teaching as a whole, to truly reflect the synchronous improvement of knowledge and ability.

The classroom is placed in training center: the classroom environment and the atmosphere are as much as possible set like the factory workshops. Teachers should use the thinking of engineering and technical personnel to organize the teaching. They should have operating ability of engineering and technical personnel.

The training center is placed in the classroom: the environment and the atmosphere of factory workshops are as much as possible set like the classroom. Engineering and technical personnel should use the thinking of teachers to organize the teaching. They should have teachers’ theoretical and level capacity.

In a word, “combining learning with practice” puts forward higher requirements for the teachers. They will become “double type” teachers. They should have more solid theoretical basis and rich practical experience. In the platform, they can teach students. In the laboratory or workshop, they will be able to operate the instrument or equipment. And for students, they will become “double
type” students. They learn theory and practice. They should not only learn the necessary theory, but also learn more skills. When they will go out of our university, these students will become skilled technical personnel who have theoretical knowledge, as well as master certain skills.

**The Teaching Model of Work-integrated Learning**

“Work-integrated learning” is a teaching model of combination of study and work. Its subject is students. It is employment oriented, and make full use of the different education environment and resources inside and outside our university, make the students really learn the knowledge and to master the skills.

**Putting Forward the Teaching Model of Work-integrated Learning.** The teaching model of work-integrated learning can be traced back to the UK "sandwich" teaching mode in 1903. On the two floors were finished in the school, the middle layer was finished in a factory. Three years later that is in 1906 some universities in the United States began to carry out the teaching mode which was basically same with UK. Call it "cooperative education". In 1983, World Association for cooperative education was established in the United States. Members of the association from more than 40 countries held an international conference every year, and this conference has more and more influence. In 2000, after discussion. The Association Council decided the cooperative education to "work integrated learning". Thus, from the name further highlight the basic characteristics of work-integrated learning.

**The Core of the Teaching Mode on Work-integrated Learning.** For students in higher vocational colleges, in a sense, the main factors affecting their success are not academic factors, but practical factors, including practical ability and practical development.

The teaching mode on work-integrated learning is an effective means of solving students’ practical ability and practical development.

Its core is that students master the basic theoretical knowledge, strengthen and improve their practical ability; enhance their social interaction, communication and teamwork ability; enhance their occupation moral quality [5].

**The Connotation of the Teaching Model on Work-integrated Learning [6].** For the "work-integrated learning" generally understands that it is a teaching model of learning in the university and working in the enterprise alternately. Namely, in the whole, the students spend part time to learning in the university and spend part time to working in the enterprise. Its essence is to use university and social education resources and the education environment to make students combine the theoretical learning and practical operation organically, to achieve the purpose of training applied talents.

**The Relationship of Teaching Model of “Combining Learning with Practice” and “Work-integrated Learning”**

“Combining learning with practice” is mainly aimed at a certain course, "hands-on" practice place is generally in training center of university; "Work-integrated learning" is mainly aimed at the talent training scheme, "work" places is commonly off-campus practice base. (Cooperative enterprises)

For a specific course, the teaching mode of “combining learning with practice” is proposed, which can make students learn while doing. A teacher speaks clearly, the students understand easily. Their practical skills can be more firmly grasp.

For the talent training scheme, the teaching mode of “work-integrated learning” is proposed. In the period of learning, the students further grasp the professional knowledge and the professional practice skills, lay a good foundation for employment.

**The Application of Teaching Model of Combining Learning with Practice and Work-integrated Learning**

In "mechatronics technology major" talents scheme, Jiangsu Open University explicitly proposed to carry out the "university enterprise cooperation". On the basis of theoretical knowledge of
"necessary and sufficient", we strengthen the practice education, closely related to production practice and social reality, and vigorously advocate and strive to practice the teaching model on combining learning with practice, work-integrated learning. Through the actual operation, in practice, the students enhance to understand the speculative knowledge [7].

The establishment of training center and training base is the fundamental guarantee of the teaching model on combining learning with practice, work-integrated learning.

The Construction of Training Center

Funded by the Chinese government, our university established mechatronics technology training center. The training center consists of three parts which are a basic skill training center, a professional skill training center and a comprehensive skill training center. The function of a basic skill training center is that the students get preliminary practice skills and strengthen the understanding of theoretical knowledge by a variety of basic skills training; The function of a professional training center is that the students get the job occupation ability; The function of a comprehensive training center is that the students improve the comprehensive occupation ability through the simulation of the manufacturing enterprise real environment.

The Establishment of Training Base

Our university established “the advanced automation technology demonstration training base” with SIEMENS industrial automation and drive technology cooperation group”. It can make our students practice having a high starting point and high level. And meets the students' future employment requirements.

Our university signed some agreements on joint construction of off-campus practice base with Kangni Company and some other companies. The students did internships in companies. After graduation, the students can go to the enterprise employment.

The Application

In order to reflect the implementation of the “combining learning with practice, work-integrated learning”, we put "theory - practice" integration classroom in mechatronics technology training center. These integration classroom are respectively “engineering drawing and computer drawing” training room, "machinery manufacturing base" training room, "CAD/CAM" training room, "sensor and detection technology" training room, “mechatronics control and PLC "training room, "numerical control technology " training room and "industrial control and MPS" training room. The teachers teach in corresponding training room to strengthen students' practical ability.

In making "mechatronics technology major" talent training scheme, in order to highlight the concept of “work-integrated learning”, we carried out the alternation working and learning, tried the internship. The first semester, the students were sent to the training base to cognition practices for 2 week. So that they will soon contact practice, understand the future work, set up enterprise consciousness; the second semester, the students were arrange in machinery manufacturing training base for 4 weeks, to visit the factory. Under the guidance of worker, they train all kinds of processing, to get into occupation accomplishment; The third semester, the students were arrange in CNC machining training base to operate CNC the machine tools for 2 weeks, to understand the structure of the NC machine tools and processing method; The fourth semester, the students were arrange in off-campus practice base for 4 weeks. They follow their masters to learn NC programming, NC debugging and maintenance to strengthen basic skills training; the fifth semester, the students were arrange in the factory workshop to do internship for one semester. They work together with the workers. They should not only study processing knowledge, but also complete the production task.

The alternating of "from learning to work, from working to learn” make the students are familiar with the enterprise, perceive enterprise atmosphere, cognitive future professional post group as soon as possible. It substantially improves the students' practical ability, post suit ability and professional quality, to achieve seamless docking between enterprises and university.
Conclusion

Through the investigation of most student’s employment, that mechatronics technology major use a teaching model on combining learning with practice, work-integrated learning with employment oriented adapts to the requirement of the enterprise for talent knowledge and skills.

In the course of teaching, using a teaching model on combining learning with practice can make the students learn the knowledge and master the skill in the process of “doing”. In the whole teaching process, using a teaching model on work- integrated learning can make the students take part in a variety of teaching practice through the alternating of "from learning to work, from working to learn", internship, to help them to put the knowledge into their creative ability, form their post skills, improve their comprehensive quality. Therefore, in the fierce market competition, they will be able to seize the employment market.

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References


