The Study of Construction of Undergraduate Workstation Based on School-enterprise Cooperation

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Abstract. In order to meet the high demands of today’s information age, social quality of talent, improve the employment rate and the quality of university students, training students' innovative ability is imminently based on practice teaching. In this paper, the general characteristics of electronic information science and technology are presented. Besides that, the production practice, the important role of graduation practice and graduation design (thesis) and other practical teaching reform in the teaching of electronic information are discussed. Combine production technology needs of enterprises to complete production practice, graduation practice and graduation design (Thesis) and other practical teaching tasks, Establish an undergraduate workstation based on the enterprise production technology platform, training professional theoretical foundation of knowledge vision, scientific and flexible way of thinking, a good team spirit, strong engineering practice and innovation capacity in the direction of a professional with expertise in the application of research skills, engineering and technical personnel, making the professional personnel training closer to the needs of society, from radically improve graduate employability and competitiveness, quality of employment and sustainable development capacity.

Introduction

In order to adapt to the high demands of the talented people in the information age society and improve the employment rate and employment quality of undergraduates, it is urgent to cultivate the practical ability of undergraduates based on practical teaching. How to make full use of social resources to construct an applied research-oriented and engineering practice-oriented talent cultivation system oriented to regional economy and industrial economy is an urgent research subject which in the absence of capital and geographical advantages and relatively backward hardware facilities. The subject tries to deepen the cooperation between school and enterprise based on the construction of the school-enterprise cooperation base in recent years[1], and combines practical teaching links such as production practice, graduation practice and graduation design (thesis) with the production technical requirements of enterprises[2,3], and establish an undergraduate workstation based on the enterprise’s production technical platform, the goal for us is to cultivate talents with the engineering and technical ability who has a solid theoretical foundation, open eye shot and intellectual side hard, scientific and flexible thinking methods, good teamwork spirit and strong engineering practice innovational ability in a professional direction of the application of research skills, which makes the professional talent training closer to social needs, and fundamentally improve the employment competitiveness, employment quality and capacity for sustainable development of graduates.

Cultivation Actuality of the Undergraduate of Electronic Information Major

According to the feature of electronic information specialty and the requirement of social quality of qualified personnel, it is necessary to change the traditional teaching mode, and to improve the training of practical teaching and innovation ability. At present, there are several problems in the cultivation of electronic information undergraduates.
The Lack of Systematic and Comprehensive Accumulation of Professional Basic Knowledge, Resulting in the Lack of Innovation Ability to Develop Stamina

With the expansion of undergraduates, employment pressure increased year by year. To alleviate the situation, graduate student becomes the first choice for many undergraduates. They usually only take the graduate student’s courses, that other specialized courses pass, thus they ignore the systematic and comprehensive mastery of the professional knowledge, hinders the improvement of comprehensive application ability, and the cultivation of practice innovation ability is far from being reached.

Difficulties in School-enterprise Cooperation, Practice Teaching Is Not in Place, Just in a Mere Formality

Because the enterprise is for profit, and the most needed for the development of the enterprise is the cooperation of technology, funds and project. In these respects, the university has little contribution to the enterprise[4,5,6], therefore, profit making in universities is greater than that of enterprises, the motivation of enterprises to participate in cooperation is few. This has brought difficulties in the implementation of the practical teaching process, resulting in the fact that students copy a written report from the internet in most experiments and finally results in a lack of practical examination of students' professional theory, the disconnection from practice and the foundation for cultivating innovation capacity is no longer available.

School Cooperation Lacks Incentive Mechanism and Institutional Guarantee

In the school-enterprise cooperation, there is often a lack of the guidance of funds, incentives and preferential policies. It is necessary to set up a special school-enterprise cooperation institution in schools or colleges, for example, the Employment Training Department set up by the Faculty of Science is a good precedent. In addition, it is necessary to set up the related management system of school enterprise cooperation, and certain operating funds and incentive policies should be given to daily operation of the specialized agencies of school-enterprise cooperation.

The Necessity and Practical Significance of Establishment of Enterprise Undergraduate Workstation

Students use their knowledge to solve practical problems and cultivate practical innovation ability, which has become an urgent requirement for the reform of talent cultivation mode in the future. The establishment of enterprise undergraduate workstation can effectively integrate various educational resources, and the practical advantages of enterprises and the theoretical advantages of the organic combination of institutions can achieve win-win cooperation[7].

The Establishment of Undergraduate Workstation will Provide the Necessary Premises and Effective Protection for the School Enrollment and Employment

For colleges and universities, attracting qualified students and improving employment quality is an important part of the school to establish a brand and develop. Enterprises play a role of a banner in implementing the goal of personnel training in schools, while schools provide human resources protection for enterprises. The virtuous cycle of enrollment and employment will effectively promote the win-win cooperation among individual students, universities and enterprises. The establishment of an enterprise undergraduate workstation will combine the human resources of colleges and universities with the material and material resources of the enterprises and transfer the cultivation of undergraduates from the laboratories of colleges and universities to the first line of enterprise research and development so that the undergraduates can pass the internship, graduation and graduation design (thesis) and other practical teaching links directly face the improvement of enterprise production technology and product research and development, and improve the overall quality of practical ability, innovation ability and ability to adapt to society by solving practical problems. Colleges and universities have changed the traditional teaching mode and tried new types
of teaching methods to promote teaching reform which will provide an important direction for the long-term development of colleges and universities; enterprises in the cooperation will be rich in human resources, with high-quality innovative talents for the enterprise will inject new vigor and vitality, so that enterprises in Intense competition will have a strong power. The direct result of the development of students and enterprises is the improvement of college brand image, which plays a positive role in promoting college enrollment and employment.

**The Establishment of Undergraduate Workstations Will Greatly Improve the Production Efficiency and Competitiveness of Enterprises**

Only increasing the production efficiency continuously can a enterprise improve its competitive ability, to survive in the fierce market competition. University can provide enterprises with labor through the university-enterprise cooperation[8]and students can improve their practical skills during production practice in enterprises ,which also save the labor cost for enterprises. College teachers can also provide technical support for the enterprises, use the research and development platform of enterprises to cultivate the undergraduates, correlate theory with practice which is helpful to solve technology problems in practical production, promote technological innovation and the upgrading of the product, improve the technology content of products, transfer the invention patent of related to the enterprise to improve production efficiency of enterprises. Furthermore, competition is talented person's competition in today's society, enterprise's development cannot go without the high quality talents. Colleges and universities can set majors and courses according to the need of enterprises to merge the cultivation of the talent with the demand of enterprise development. The university-enterprise cooperation can make college education fit in with the demand of enterprise development, at the same time, can let enterprise employees re-educate in colleges and universities to enrich the human resources of enterprises.

**The Establishment of Undergraduate Workstations Creates Opportunities and Platforms for Improving Teaching Level**

The establishment of the undergraduate workstation should be closely combined with the "Excellent Engineer Education Training Program" of national education department, to carry out in-depth participation in the training process of industry enterprises. To train engineering talents according to common standards and industry standards, strengthen training students' engineering ability and innovation ability[9,10,11]. Schools should always adhere to "making professional teachers and technical personnel's communication and learning normalized". Professional teachers go to enterprises to communicate and practice during the summer vacation, enterprise technical personnel give lectures in colleges and universities. Teachers can improve the teaching content and make the teaching more pertinence based on the implementation of the students' practice links, thus greatly improving the teachers' ability in teaching, research and technical services. Students can also bring problems that encountered in the training process back to school to study, which will effectively promote teaching reform and scientific research.

**Training Mode and System Guarantee for Enterprise Undergraduates Workstation**

Based on the concept of collaborative innovation, the university-enterprise cooperation has been realized by using the enterprise undergraduate workstation as the training platform for undergraduate students. In order to ensure the enterprise workstation of undergraduate students carry out benignly, orderly and effectively, the quality of personnel training must be perfected in the system of personnel training mode.

**Offer Elective Courses with Strong Practicality Together with Enterprises, and Cultivate the Ability of Preliminary Scientific and Technological Innovation**

Stress on the premise of strengthening discipline construction, pay attention to strengthen students' creative foundation of professional knowledge theory, renew the idea, reform the
personnel training mode, to carry out the education reform deeply. Combining with the demands of technical enterprise, set up some practical courses which are closely related to the enterprise requirements (such as the MSP430 single chip microcomputer principle and application courses of US TI company), making the student learn actively, participating in classroom teaching, improving teaching effect, and developing a preliminary practical and innovative ability.

**Conduct Basic Scientific Research Capacity on the Platform of the Innovation Laboratory to Improve the Entrance Examination Rate and the Quality of Employment**

Value and extend the experimental teaching, opening more comprehensive design experimental project, make full use of the physical electronic design innovation laboratory. University student science and technology innovation program that supported by colleges, such as National university student innovation program, university student science and technology innovation competition of Shandong, national college student extracurricular academic science and technology works competition of "Challenge cup" and National electronic design competition for college students, should play a role of radiation and guiding. Carry on basic scientific research ability training, lay the foundation for entering undergraduate workstations, which will greatly improve the number of students graduate push and the quality of employment. The achievements of construction in the past seven years are shown in Table 1.

<table>
<thead>
<tr>
<th>year</th>
<th>The number of student participate in College student science and technology innovation competition</th>
<th>The number of student participate in student innovation program</th>
<th>The number of student participate in university student science and technology innovation competition of Shandong province</th>
<th>The number of student participate in national college student extracurricular academic science and technology works competition of &quot;Challenge cup&quot;</th>
<th>The number of student participate in national electronic design competition for college students</th>
<th>The number of student participate in innovation contest and employmeent of famous enterprises</th>
<th>The number of graduate students participating in the innovation competition (including the push and exemption)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>2010</td>
<td>12</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>2011</td>
<td>16</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>2012</td>
<td>20</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>15</td>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>2013</td>
<td>24</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>18</td>
<td>18</td>
<td>6</td>
</tr>
<tr>
<td>2014</td>
<td>24</td>
<td>12</td>
<td>9</td>
<td>3</td>
<td>18</td>
<td>22</td>
<td>8</td>
</tr>
<tr>
<td>2015</td>
<td>24</td>
<td>12</td>
<td>12</td>
<td>9</td>
<td>24</td>
<td>26</td>
<td>12</td>
</tr>
</tbody>
</table>

**Establish a Dual Tutor System for Universities and Enterprises**

The technical personnel who have the senior title of the enterprise declare freely, the academic committee consist of the university teacher give evaluation, to give the tutor qualification to enterprise undergraduate. College tutors and corporate mentors work together to formulate training project for undergraduates. The dual tutor system will be implement after undergraduates enter the enterprise undergraduate work station. The corporate tutor is mainly responsible for the guidance of the undergraduate practice session and the school tutor is mainly responsible for the guidance of the undergraduate theoretical link.

**Establishment of Research for Enterprise Opening and Project Management System**

Enterprises set up an open subject system. Scientific planning is carried out on the basis of the research and development task of the enterprise and the scientific research projects. The difficulty of the selected open subject is suitable, There are academic frontiers, practical in practice and
systematic in theory. These open topics are selected as the graduation thesis topic for undergraduate students, and in the subject research, practical innovation ability is emphasized.

After the undergraduates have chosen the topic of graduation thesis, sign a project agreement with the workstation, have clear objectives, tasks, phased expected results and conditions for acceptance of problems. Enterprises create a good working environment and research platform for them. After the completion of the project, the project is assessed by a joint organization of enterprises and colleges and universities, and enterprises give undergraduates project award or the retention, and form an effective incentive mechanism.

**Building Perfect Management System of Undergraduate Workstation**

Deepening the reform of the school enterprise cooperation system and improving the effect of practice teaching. Breaking traditional practice organization mode of strong planning and lack of flexibility. The undergraduate workstation is responsible for collecting the production technology subject provided by the enterprise. Let the students choose the appropriate task to get into the station according to their own expertise and interest, which can not only solve the problems of production technology of enterprises, but also exercise their own creative ability of practice. Building the undergraduate workstation into a workplace for specific implementation, study and research, enterprise technical personnel, management staff and professional teachers constitute the student project guidance group together, communicating with the enterprise about the students' treatment, safety, training, management, etc, signing construction agreement and memorandum of understanding.

**Establishing a Long-term Mechanism for School Enterprise Cooperation**

The cooperation between universities and enterprises must consider the long-term development. If the cooperation is changed and a new cooperative enterprise should be chosen every year, whether to university or to the enterprise, it is a waste of manpower, material and financial resources. Even if cooperation, the relationship and credibility are not enough to ensure the sustainable development of the long term cooperation. Therefore, it should be more standing in the enterprise development perspective, finding more factors conducive to the development of enterprises, seeking both sides to win. Under the attraction of high interest, the enterprise will naturally improve the enthusiasm of the school enterprise cooperation. The school's idea of training talents, specialty and curriculum, teaching methods should meet the needs of the development of the enterprise so as to establish a long-term cooperation mechanism. At the same time, some preferential policies and incentives of the government are introduced to encourage enterprises to participate in university-enterprise cooperation.

**Summary**

To sum up, combining training plan with training target of the electronic information professional students. In the school, through various innovative activities and scientific and technological innovation competitions, the students' preliminary practical innovation and scientific research ability are improved. Outside the school, we should make full use of social resource, open an after-school teaching base and build an undergraduate workstation. Combine production technology needs of enterprises to complete production practice, graduation practice and graduation design(Thesis) and other practical teaching tasks, which promote the reform of undergraduate training mechanism in Colleges and Universities. The reform of training mode of talents conforms to the training law of the students of electronic information specialty, which makes students earlier access to understand the status of the enterprise production and technical requirements. The equivalent of a more comprehensive pre-service training. Through the production practice of the undergraduate workstation and the whole task process of graduation design, the students' practical innovation skills and preliminary scientific research ability are well exercised. The competitiveness and quality of the employment are improved. The establishment of an undergraduate workstation
has promoted the realization of the innovative education model of undergraduate students and promoted the deepening of the cooperation platform of production, which cultivates the applied technology talents who are in urgent need of the social and economic development.

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