Practice on the Mechanism Innovation of Cooperation between Colleges and Enterprises to Train Talents

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Abstract. In order to solve the contradiction between talent training of colleges and demand of industry, we explored the new mode of cultivating the talents in mobile application development through the coordination between colleges and enterprises to meet the needs of enterprises and industries. The college and enterprises jointly developed the talent specifications and teaching models for mobile applications development, and then developed a case library of enterprise projects which suits for the college students so as to promote the project driven teaching. The teaching team consists of technical staff of enterprises and the qualified teachers trained. The teaching adopts the method of combining the online platform with the classroom teaching. In the process of colleges combining with industry to train talents, colleges and enterprises are fully interactive and integrated, thus forming a benign operating mechanism. It can be used as a reference for local higher education institutions to cultivate engineering practical talents with strong engineering practice ability and innovative consciousness and to meet the needs of society.

Introduction

At present, the outstanding contradiction of training talent in local colleges and universities is mainly embodied in two aspects. First, colleges train the homogeneous talents according to the discipline and specialty knowledge system, and it will lead to contradictions between talents. This conflicts with the demand of individualized talents for enterprises. Second, colleges pay attention to theoretical teaching according to their own understanding of discipline and teaching expertise. This conflicts with that enterprises focus on practical ability from their own business needs[1,2]. Therefore, we explored and practiced the mode of training talents through industry-university cooperation. Colleges closely cooperate with enterprises. Enterprises participated in the whole process of training talents through various means and ways. Colleges should cooperate with enterprises together to train the application-oriented talents so as to achieve the conformity between education and employment.

The development and update of mobile application development technology is fast. This is also one of the characteristics of application-oriented talents training. However, there are some problems in the training talents of mobile application development[3,4]. The curriculum system and teaching content often lag behind the technological development, and the knowledge update often lags behind the application of technology. The graduates in software major trained by colleges are not competent for the practical demand of mobile application enterprises. This phenomenon is prevalent in the training talents in application-oriented universities. Therefore, we took the training talents of mobile application development as an example, and explored a new mode of training talents through industry-university cooperation.

The Mode and Methods of Training Talents

Cooperating with the representative mobile application development enterprises and mobile application development training institutions, we explored and practiced the training talents of mobile application development who have the engineering practice ability and innovation ability to meet the social needs.
Dynamic, Quantifiable Requirements for Mobile Application Developers

For making the teaching objective more clear, we created an analytical model of talent requirements for mobile application development as well as the corresponding evaluation system of professional ability and innovative ability. In contrast to the past, our model and evaluation system are dynamic and quantifiable. The analytical model uses a three-dimensional model. The first dimension is the position role, which is based on the various roles of the mobile software development process, including the project manager, salesman, software designer, programmer, tester and other position roles. The second dimension is the project stage, which is based on the time. The project stages are as the main units, including requirements analysis, summary design, detailed design, system implementation, testing, publishing, maintenance and other stages. The third dimension is the capacity requirements. Based on the previous two dimensional content, we can define the corresponding ability. For example, the salesman, in the requirement analysis stage, should have the ability to communicate with customers as well as requirements elicitation and definition and so on. Because all software engineering projects have been complete output demands, that are documentations and results requirements at all stages of the project development process, according to the quality of documents and the merits of the results submitted at each stage, the specific evaluation criteria can be formed. Combining with the ability requirements in the third dimension we can easily form a complete ability evaluation system. The basic part of the model is relatively fixed. The other parts involving specific project content, time points etc. need to be dynamically generated according to the specific circumstances of the project used in teaching.

Project-oriented Teaching Model Based on Collaborative Training

We construct the entire teaching system starting from the basic. To improve the teaching system we both reverse the entire teaching system according to the needs of enterprises and perfect pre order teaching content according to the follow-up needs. The teaching is carried out with the project provided by the enterprise. The contents of training are from simple to difficult, which are all independent entities. At the end of the course, we examine students using a relatively complete enterprise mobile application as assessment method. The teaching content is updated according to the development of economy and technology. The collaborative enterprises should be involved in the training of the students, and participate in the teaching process. In this process, the technology, ideas and culture of the enterprises can be brought to the colleges so as to ensure the connection between the ability training of the students and position capability requirements of the enterprises.

The college teachers together with the enterprise engineers share the teaching work to form the double teacher teaching mode. In the course of teaching, the curriculum group is composed of enterprise engineers and college teachers. They learn from each other. When explaining the project, the teacher arranges the relevant knowledge points, as well as the project implementation steps, notes and other issues into the key points of knowledge and technology so that students can easily study and review. Teachers guide students how to collect notes, to pay attention to practical operation and the key techniques so as to improve the course teaching. In the process of teaching, the enterprise engineer serves as the keynote teacher and the college teacher as the assistant. This teaching mode can make full use of the rich experience of the enterprise teacher project and the sophisticated teaching methods of the college teachers. Adopting apprenticeship system students are divided into some project development teams. A development team is composed of the enterprise engineer as the development team leader and college full-time teachers as a supplement. The apprenticeship teaching mode can strengthen the communication between the enterprise teachers and students. By means of those, students can understand and grasp the actual enterprise development model and the latest development technology so as to better foster the students' mobile application technology and development thinking.
Co-constructing the Practical Training Base and the Online Teaching Platform

The practical training base is an important condition to achieve the teaching goal. A good practical training environment is also an important guarantee to achieve the goal of training talent. The construction of practice training base should not only meet the teaching requirements, but also adapt to the needs of enterprise production. It is necessary to try to create an atmosphere of enterprise production design so that the practice teaching in the college can be integrated with the enterprise. It is a good choice to introduce cooperative enterprises to build training bases. The resources of both sides can be fully integrated and utilized. It can not only improve the environment of college practice and training teaching, but also get the most advanced technical support from the enterprises. To ensure that the training base constructed is scientific and advanced, the enterprises are invited to participate in constructing the practical training base of mobile application development in the whole process including construction plan, design layout, equipment selection, hardware and software installation, check and acceptance and so on. At the same time, in enterprises, the talent training bases outside the college also have been set up. Thus, students can be regularly sent out for probation and specific-job training every year. In this way, we can not only realize the maximization of the benefit in the assets utilization and the teaching function of the practical training bases, but also train the talents needed by enterprises, and solve the employment problems of students in the college such that truly achieves the seamless connection with the posts of enterprises. Through the cooperation between college and the enterprise, we have built a sharable online teaching platform. By means of the platform, students can share the materials and videos used in the enterprise technology development and employee training, as well as the teaching resources and the practical engineering case so as to make students more aware of social needs and new technology. In the platform, we also set up the communication channels between the enterprise and the students. This strengthens the communication between students and enterprises so that the students can understand better about the enterprise culture and the demand, and clear up the purpose of their study.

Constructing the Double Qualified Teaching Team by Enterprise Resources

The key to foster the applying talents in developing mobile applications is the combination of production and practice. The teacher is the guide of the training talent. In order to train suitable talents, first of all, teachers should have strong application ability and rich practical experiences, otherwise, they are just empty talk. Therefore, in order to train the mobile application development talents conforming to the social needs, we must first establish a dual quality teaching team. We established a full-time and part-time teaching team by external experts or training internal teachers etc. Using the enterprise resources, we have arranged for a group of young teachers to go to the enterprise. Through the combination of enterprise training and professional practice in cooperative enterprises, they can enrich their practical experience and improve their ability to solve practical problems. On the other hand, we employed experts and engineers with extensive experience in the cooperative enterprises as the part time teachers such that can link the class with the actual production.

Concrete Practice

Through the cooperation between college and enterprise, under the project guidance teaching mode, we carried out the following practice in the training talents of mobile application development.

Full Social Investigation

First of all, in conjunction with the economy development of Shanghai, we actively link up with the local industry. We grasped the real needs of society through a variety of forms such as visiting graduates, interviewing enterprises, taking part in the local economic forums and industrial development seminars etc. Then, through in-depth analysis of the survey materials, we summed up the talent demand trend in mobile applications development. Finally, under the coordination of
enterprises, we have established a three-dimensional requirements model for the training talent of mobile applications development according to the actual situation of this major. The model is the dynamic and quantifiable.

Multi Way and Full Cycle Implementation of Project-based Teaching

All the projects used in teaching come from the real cases of enterprises. In order to be suitable for teaching, under the cooperation of college and enterprises, these projects have been properly modified. The corresponding teaching case library has been set up which will be updated dynamically according to the development of technology. Project-based teaching runs through the whole period of training. In the process of training students, the teaching activities are organized by both teachers and students through a series of projects. This teaching model breaks through the tradition of the general project teaching method which implements teaching only for a certain link or phase of the project. In the course of teaching practice, teachers lead students to create project task scenarios in accordance with enterprise operation mode. The teacher arranged the content of the course in terms of projects, programs, tasks, etc. The teacher may design the latest mobile application software into several projects and introduce new knowledge into the projects. Students participate in the teaching process in the form of a project group or team and complete each task. Through the integration of resources, the overall deployment and creating the atmosphere, the engineering practice and innovation idea will be integrated into the curriculum teaching practice so as to improve the effectiveness of training students' engineering practice and innovation ability.

Using Enterprise Resources to Establish Network Teaching Sharing Platform

The construction of the network teaching platform can make the students more convenient and more flexible in the course learning. Teachers can more easily grasp the students' learning trends. Teachers and students can better interaction. The course can be shared by more people so that not only the teaching resources can be effectively utilized, but also the curriculum can be further improved.

Supporting Enterprises to Set up Experimental Training Bases

We signed cooperation agreements with enterprises and encouraged them to invest experimental training equipment in college. We worked in coordination with enterprises to draw up the talent training programs. In cooperation, we regulated the sharing mechanism of rights and interests in order to enable enterprises to gain profits, or to obtain the needed talents, or to have a chance to be famous. On the one hand, the research achievements of colleges can support enterprises bigger and stronger. On the other hand, the talents trained by colleges can reserve talents for the development of enterprises. The cooperative development mechanism constructed by colleges and enterprises is diversification and all-round. While participating in training the creative talents with engineering practice ability and teaching reform in the college, enterprises have also become beneficiaries and stakeholders in their own personnel training and reserving, project research and development, scientific and technological research, achievements transformation, and so on.

The College Collaborates with the Enterprise to Build the Teaching Team

Teaching staff is the key to realize the goal of mobile application talents training. In order to solve the problem of disconnection between the specialized teaching and production in mobile application in colleges, it is essential to train a team of teachers who have both high theoretical level and strong practical ability. To train the double-qualified teachers, we should adopt the method of "internal training and external introduction" through the cooperation between colleges and enterprises. On the one hand, we should make full use of the advantages of industry-university-research cooperation between colleges and enterprises, and actively participate in seminars, academic forums and academic conferences organized by enterprises. In this way, the college teachers can grasp the leading technology and development trends of the industry in time, update the content of curriculum and the structure of teachers' knowledge, and promote the interaction between schools and enterprises, so as to train the practical ability of college teachers.
On the other hand, the enterprise experts come to class to bring the actual production and engineering standards into the classroom, so as to raise the level of theoretical application of college teachers. In the training of young teachers, we have established a system for young teachers to exercise in enterprise regularly. We have introduced corresponding incentive measures, and identified the assessment task so that we can achieve the normal exercise of young teachers under the enterprise. We have carried out the teaching reform of cooperative teaching by both the college and enterprises. The professional teachers together with technical backbone of enterprises undertake the teaching task of curriculum. The teaching is guided by the project. The whole process of teaching is completed by the cooperation of college and enterprise, such as making teaching plan, preparing lessons, carrying out the teaching of the course content, formulating examination methods and evaluating grades, etc. In this way, we can form a long-term benign interaction between colleges and enterprises, as well as between professional teachers and technical backbone of enterprises. Thus, we can build a teaching team with deep integration based on the cooperation between college and enterprises.

**High Level Competitions and Innovative Projects to Test the Teaching Results**

Teachers from college and enterprise jointly guide students to participate in a variety of high-level innovative competitions and projects funded by enterprises. These activities can not only promote students' interest in learning, stimulate students' awareness of innovation, but also test the effect of teaching. Students in the actual project can learn by doing and do by learning so as to accumulate experience and enhance technical level. Through these practical exercises, students increase their interest in learning, improve their enthusiasm for learning. Gradually, the students' learning mode was changed from passive acceptance to inquiry mode, and the effect of cooperative education was tested.

**Conclusion**

Taking the typical training talent of mobile application development as an example, we explored and practiced a new mode of training talents through industry-university cooperation. With the full participation of the enterprises, we established the requirements of training talents in line with the actual needs of enterprises. The teaching mode satisfying engineering practice is put forward. The practice training base and online network teaching platform which are close to the real environment are built. A case base of enterprise project is developed. A teaching team is established which composed of the college's teachers together with the front-line engineers of enterprises. The practice results show that through a series of teaching reform, we can train talents to meet the social needs.

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**References**


