

Reform of Cooperative Education Model for Mobile Application Development Specialty in Higher Vocational College

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Abstract. The purpose of this study is to deepen the integration of industry and education through School-enterprise cooperation, explore innovative training mode of mobile application development professionals, reform and practice in personnel training orientation, curriculum system construction, teaching methods, and teacher team construction. The results of this study can provide beneficial experience and reference value for the reform of personnel training mode of information technology related majors in higher vocational education.

Keywords: Higher Vocational College; Mobile Application Development; Personnel Training; Collaborative Education.

1. Introduction

Under the background of rapid development of new economy characterized by new technology, new industry and new model, engineering education in China urgently needs to train diversified and innovative scientific and technological talents. On October 15, 2018, the Ministry of Education, the Ministry of Industry and Information Technology and the Chinese Academy of Engineering jointly issued the Opinions on Accelerating the Construction and Development of New Engineering and Technical Disciplines and Implementing the Education and Training Plan for Excellent Engineers 2.0. Thus, the construction of " New Engineering and Technical Disciplines " has become a far-sighted national strategic action. The historical mission of " New Engineering and Technical Disciplines " is to train many high-quality and high-skilled talents for the country. In this process, higher education is required to strengthen the investigation of the demand for industrial talents. It is necessary to update the existing curriculum system and teaching content according to the demand of industrial development for talents. It is necessary to change the old teaching methods with students as the center, improve the education mode with new technology, and train talents with high specifications and quality standards based on international engineering education certification standards. Therefore, the construction of " New Engineering and Technical Disciplines " puts forward new requirements for higher education, especially for higher vocational education. How to cultivate high-quality talents with strong engineering practice ability, innovative ability and international competitiveness, this is worth of deep consideration in higher vocational colleges [1]. Mobile Application Development is a new major in Guangdong Polytechnic Institute. It began to enroll students in September 2016. Our training goal is to meet the needs of the industry and train high-quality technical and skilled personnel engaged in mobile application software development, testing and technical support. As a newly added specialty, it is easy for us to grasp the latest development of industry and technology, and rapidly explore new ideas and methods of personnel training. The purpose of this study is to deepen the integration of industry and education through School-enterprise cooperation, to investigate the needs of mobile application development professionals in the industry and enterprises, to explore the innovative training mode of mobile application development professionals, and to reform and practice the orientation of personnel training, the construction of curriculum system, the teaching methods and the construction of teaching staff. The results of this study can provide beneficial experience and reference value for the reform of personnel training mode of information technology related majors in higher vocational education.

2. Reform of Cooperative Education Model

2.1 Constructing and Establishing the Specification of Talents Training

2.1.1 Talent Training Orientation

To meet the needs of the development of the mobile Internet industry, we should cultivate high-tech and skilled mobile application development professionals who are familiar with the basic knowledge of computers, master the application and development technology of the mainstream mobile platforms such as Android, JavaScript and HTML5, have the ability to develop mobile terminal devices, and have good professional ethics and comprehensive quality. As illustrated in Fig. 1, after graduation, students can engage in Android application development, Web application development, Mobile Application Testing, Mobile product operation and promotion, Mobile Front-end Development, WeChat public platform development, etc. The three positions on the right are the main traditional jobs, and the three positions on the left are the new jobs in recent years.



Fig. 1 Jobs in employment

2.1.2 Major Professional Jobs, Typical Tasks and Post Competence Requirements

Through in-depth investigation and research of industry enterprises, the typical job tasks and professional abilities of the graduates of this major are analyzed. The main traditional job positions, typical tasks and post competence requirements of mobile application development specialty is established as shown in Table 1 below.

2.2 Specialty Modular Curriculum Design

By docking the needs of enterprises with the training of talents, a curriculum system including four modules of "Specialty Basics, Specialty Knowledge and Technology, Specialty Core Skills and Vocational Skills " is constructed, as illustrated in Fig.2, which aims at the cultivation of vocational post competence. The curriculum standards, teaching contents and evaluation methods are worked out jointly with enterprise engineers. Talent training are carried out according to the requirements of professional posts, to improve the quality of personnel training and enhance the awareness of innovation and entrepreneurship [2].

Table 1. Major Professional Jobs, Typical Tasks and Post Competence Requirements

Jobs	Tasks	Competence Requirements
Android application development	Reading and Writing Design Documents	Read all kinds of design documents
		Can correctly understand the software design idea described by UML language
	Programming	Build Development Environment
		Familiar with relevant coding specifications
		Master Java programming language
		Use Android Studio development tool skillfully
		Master Android Development Technology
	Ability to use third-party development libraries for mobile application development	
	Unit Testing	Ability to write test cases to complete module testing of mobile applications
Web application development	Reading and Writing Design Documents	Read all kinds of design documents
		Can correctly understand the software design idea described by UML language
	Programming	Build Development Environment
		Familiar with relevant coding specifications
		Master Java programming language
		Skillful use of Eclipse and other development tools, skilled use of Tomcat server software
		Master Java Web Programming
		Familiar with Java EE framework, able to use Spring + Spring MVC + MyBatis to develop complex web systems
	Unit Testing	Ability to write test cases to complete module testing of mobile applications
Mobile Application Testing	Analysis and Design of Testing	Ability to develop test plans based on project plans and requirements
		Ability to set up test team and reasonably arrange team tasks
		Ability to design test cases
		Ability to manage test requirements and test cases using test management tools
	Test Task Execution	Skilled in using test tools or platforms
		Ability to build software testing environment according to test requirements
		Ability to execute tests based on test cases and register defects
		Master software defect description and defect management
	Analysis of test results	Ability to analyze the results, draw test conclusions, and write test reports

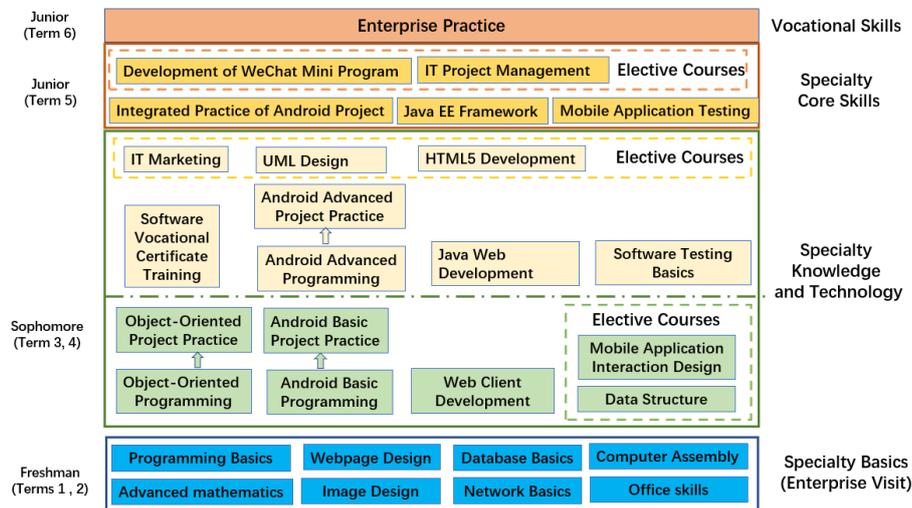


Fig. 2 Modular Curriculum Design

2.3 Student-centered Teaching Mode

Through the deep integration of information technology and curriculum, the traditional physical learning environment and network virtual environment can be combined to complement and promote each other, change the traditional "teacher-centered" teaching mode, and realize the "teacher-centered, student-centered" new teaching mode. In the field of vocational education, blended learning has a positive effect on improving students' practical skills and solving problems based on real problems or situations [3]. In the process of blended teaching, an excellent network course platform is needed to support teaching design and activities. As shown in Fig. 3, and Fig. 4, most of the core professional courses are completed on the platform of mosoteach (<https://www.mosoteach.cn/>) and ityxb (<http://tch.ityxb.com/>).



Fig. 3 Core Professional Courses in mosoteach Platform



Fig. 4 Core Professional Courses in ityxb Platform

2.4 Construction of Teachers' Team

Teachers are the main factors influencing the effect of curriculum [4]. To build a high-quality and high-level vocational teaching team and improve the quality of teaching, this study explores an effective way "3+3" to build a professional teaching team, as depicted in Fig. 5. With the rapid updating of information technology, teachers' professional skills can be continuously improved through curriculum project practice. Moreover, teachers can further enhance teachers' professional skills by instructing students to participate in higher professional skills competitions. Relying on AI Innovation Research Center and Dual Qualified Teacher Studio, teachers can lead students to complete scientific research and product development. Thus, teachers can master advanced information technology and improve product development ability. Finally, by arranging teachers to participate in the practice in enterprises every year, teachers' research results can be combined with the enterprise and market demand, and the ability to transform the results can be enhanced.



Fig 5. "3+3" Construction of Teachers' Team

3. Reform Effectiveness

3.1 Achievements in Teaching and Scientific Research

Since the implementation of the reform, all the teachers of mobile application development specialty have worked hard and made great progress. Up till now, all teachers have published more than 10 academic papers in various journals and conferences, gained 7 software copyright and patents, applied more than 10 teaching and scientific research projects, and established 2 excellent online open courses at school level.

3.2 Awards in Student Competitions

Students are organized to participate in five competitions at all levels. The results of the competitions are excellent. The Table 2 is summarized, and students have won two first-class national prizes, one third-class national prize and two first-class provincial prizes.

Table 2. Awards in Student Competitions

Year	Competition	Level
2019	Development of Mobile Internet Application Software Competition	First-class National Prize
2018	Blue Bridge Cup Programming Competition	First-class National Prize
2019	Software Testing Competition	Third-class National Prize
2018	Development of Mobile Internet Application Software Competition	First-class Provincial Prize
2018	Software Testing Competition	First-class Provincial Prize

4. Summary

In short, through School-enterprise cooperation, collaborative education, and the construction of a deep integration of professional talent training system with the industry, we can continuously provide high-quality talents for the development of the mobile Internet industry, so that my specialty can truly become a training base for high-skilled talents.

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