

## Exploration and Practice of ICT Application Innovation Training Base Construction

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**Abstract:** With the rise of cloud computing and the arrival of the era of big data, IT industry is rapidly integrating resources and knowledge and skills. The arrival of the digital age not only puts forward higher demands for ICT (Information and Communication Technology) talents themselves, but also puts forward higher requirements than before for all levels of education institutions and ICT industry. How to realize the rapid link between school education and industry development, how to concentrate students and social students from the general practitioners into the growth link of ICT enterprise talents, and how to make ICT talents create greater value for their employers will become the common problems faced by ICT enterprises and educational institutions in the next 5-10 years. Starting from the above problems, this paper analyses the construction plan and practice of ICT application innovation training base in higher vocational colleges.

### 1. Work hand in hand with Huawei Network College to achieve rapid convergence between Education and Industry

Our school (Chongqing College of Electronic Engineering) teams up with Huawei Network College that draws support from technological advantages of Huawei in IT industry, and adopts advanced ICT vocational certification concept. it follows the law of talent career development, trains excellent ICT talents, and realizes the rapid connection between education and industry. In the process of implementation, we will discuss with excellent ICT enterprises the integration direction of new technology and existing discipline system, design and improve new disciplines, cultivate discipline teachers, and build an experimental training environment and online learning platform matching ICT certification. We will work together to create high-quality Chinese ICT talents with multi-level and multi-angle to adapt to industry changes.[1]

In the construction of ICT talent training system, our institute (College of Communications Engineering) helps to construct the ICT talent training system of educational institutions from the following four aspects: (1) talent standards: based on the current situation and development of the industry, identify ICT talent capacity needs, design industry talent standards, and lead the discipline construction of institutions by standards.(2) Teaching resources: Based on the current trends of disciplines and industries, Huawei collaborative colleges and universities design the integration of new and old courses, build the training and certification of lecturers ability, the evolution of curriculum system and supporting laboratories.(3) Operation management: In order to effectively carry out talent training, that is, to provide continuous and customized support in the daily teaching activities of colleges and universities in terms of international processes, advanced organizational concepts and marketing experience.(4) Collaborative Alliance: Construct a healthy and sustainable ICT talent ecological chain, promote the convergence of excellent ICT talents and enterprise employment needs, and build a good ICT talent ecological chain.[2]

## **2. ICT Application Innovation Training Base Planning**

### **2.1 Master Plan**

In line with the purpose of training and transporting talents for the society and industry, and with the goal of training excellent graduates who meet the requirements of enterprise employment, Huawei Company, a leading global ICT solution provider, has established a long-term, stable and interoperable school-enterprise cooperation relationship. It is planned to upgrade the software and hardware of the discipline comprehensively in the next 3-5 years on the basis of the existing professional curriculum system. Cooperation areas include: training room construction program, upgrading and expansion of training facilities, Elearning teaching IT platform, training teachers training and so on.

Cooperate with Huawei to build a national demonstration ICT training base, specifically on the operational level, according to the following four steps: the first step: in the first phase of construction of the training base, introduce the two cornerstone disciplines of routing and switching HCNA-RS and network security HCNA-Security training system, explore new training system construction mode, summarize experience for promoting school-enterprise cooperation; the second step: to see the results, in the construction of routing and communication. On the basis of changing and network security training system, we will continue to import NA-level training system in other upper application technology fields, such as wireless local area network, storage and unified communication, etc., and ICT training system will show its scale. The third step is to build a multi-level practical course system covering the whole field of ICT by introducing cloud computing courses and higher-level NP training courses. Learning plays a benchmarking role in the southwest area; the fourth step is to build brand, introduce ICT integrated curriculum, integrate training teaching with large-scale enterprise application scenarios, and achieve the leading level of comprehensive ability of training system, which has certain influence and educational brand effect in the industry.

### **2.2 Construction Plan**

By introducing real project cases into classroom teaching, we can promote the reform of practical teaching. In order to realize the practicality, openness and professionalism of the teaching process, we should cooperate closely with enterprises in the design and implementation of practical teaching programs, the training of instructors, collaborative management and the training of professional quality. At the same time, the training base will face the society and enterprises, actively carry out vocational skills training and appraisal, continuing education, and strive to create more social and economic benefits. On the basis of the existing training bases, keep up with the development of the industry, improve the ICT application innovation training base, and establish the “ICT application innovation training base” which integrates skills training, certification examination, technical service, technical training and application innovation functions. The main work includes: upgrading and perfecting the original training curriculum system, introducing new training curriculum, and improving the integration of curriculum and certificate.

The capacity of lecturers has been continuously improved and the training environment has been upgraded. We will strive to open 16 ICT courses, 10 ICT professionals and lecturers, covering five ICT specialty fields, with an annual training scale of more than 1000 students, and 200 vocational certification students, so as to achieve the scale and results of ICT training and achieve the goal of leading level of similar institutions in southwestern China.

#### **2.2.1 Introducing Industry Standards and Constructing a Scientific Professional Course System**

Introduce ICT training courses, renew the existing ICT course authorization, and consult with Huawei Company, expand the scope of authorization to students and social personages in Chongqing, and gradually carry out the recruitment of social trainees and the opening of professional training courses. The training scope includes: routing switching HCNA-RS course,

network security HCNA-Security course, wireless LAN HCNA-WLAN course, data storage HCNA-Storage course, video communication HCNA-VC course, video surveillance-IV course, cloud computing HCNA-Cloud course, routing switching engineering application course, network security engineering application course.[1]

### **2.2.2 Project-based Teaching of Professional Courses**

Starting from interests of students, students are organized to participate in teaching activities or scientific research project selection of teachers, and teachers instruct students to carry out experimental training according to the project. The project appears in the form of experimental training or curriculum design; the implementation process of the project is tracked and checked in real time; finally, 15% to 20% of the project score is included in the total scores of the corresponding professional courses in the semester.[3-4]

### **2.2.3 Sharing Digital Resources with Enterprises and Making Rational Use of Modern Teaching Means**

In order to facilitate students to learn at any place and at any time, a number of excellent resource-sharing courses and online open courses have been built to enable students to learn online in their spare time through the Internet. At the same time, online digital resources have been shared with Huawei and other enterprises. Students can learn the latest industry development trends, product-related technologies, expert teaching videos, special lectures and engineering projects online. Examples, typical troubleshooting and other knowledge broaden knowledge and enhance of students and professional skills.

### **2.2.4 Training for Teachers**

The training of applied technical talents requires a strong team of teachers with strong professional practice ability. According to the requirements of ICT specialty construction, professional course teachers are arranged to go to relevant ICT enterprises for professional course training and project research and development practice. When instructing experiment of students, practice and graduation design, teachers should be in line with the actual needs of the ICT industry, guide them on the basis of industry standards and the requirements of ICT post standards; encourage teachers to develop various types of professional technology development and services, enhance research and development ability and practical ability of teachers, and build a team of professional teachers with comprehensive development of “three teachers and three abilities” and high technical level. At the same time, relying on Huawei Network College, our school has introduced several project technical directors of Huawei Industry Chain as part-time teachers.

### **2.2.5 Construction of off-campus training base**

The off-campus training base is an important place to complete the basic practice teaching task, train practical ability of students, innovative spirit and innovative ability, and it is also a real career simulation before students go to employment. Especially for our students, the construction of off-campus bases is directly related to the quality of teaching and the cultivation of skilled talents. It plays a very important role in the cultivation of high-quality talents practical ability, innovation and entrepreneurship. At the same time, it strengthens professional ability through on-the-job training of students, and plays an inestimable role in improving the employment rate. For teachers engaged in Higher Vocational education, taking part in on-the-job training in enterprises can improve their professional accomplishment, improve their ability to solve complex problems by integrating theory with practice, and promote their teaching ability.

### **2.2.6 Professional competition**

Promote teaching by competition and improve project practice level of students. To organize students to participate in various competitions closely related to their majors so as to familiarize them with the whole implementation process of the project and improve their innovative practical ability and project development level. Organize students to participate in various professional

competitions such as “National Vocational College Skills Competition”, “4G Network Construction Technology Competition”, “National College Students Electronic Design Competition”, “DaTang Cup” National Higher Vocational College Students Mobile Communication Technology Competition”, “National Vocational College Intelligent MAN Deployment and Application Skills Competition” and so on, so as to enhance professional competence and level through professional competitions of students .To promote professional development.

### 3. ICT Training Platform Construction

Expansion of data communication and security technology training room, WLAN, cloud computing and data storage and video communication four training rooms, to meet the training rate of 100%; addition of eight off-campus training bases, receiving no less than 50% of the total number of students in this major every year for off-campus internship; improvement of the management system of the training room, the use of modern information technology, to achieve modern management; external training and development of modern management Technical services, training more than 100 people.

#### 3.1 Data Communication and Safety Technology Training Device

The scheme of data communication and security technology training room integrates IP network technology and network security technology to meet the teaching and training needs of four intermediate and advanced technology courses, namely HCNA-RS, HCNP-RS, HCNA-Security and HCNA-Security. The latest generation of AR G3 routers, Sx7 switches, USG firewalls, NIP intrusion defense system, TSM terminal security management system, DSM file security system, management equipment and connection components constitute protocols and technologies supporting Vlan partition, Truck technology, STP, multicast, multi-channel convergence, routing redundancy and other levels, supporting terminal security management, file security management ,eLog security management, unified security management and so on. IP network equipments and security equipments can be integrated through network connection, cooperate with Huawei products and HCNA certification courses, and produce the best teaching effect.

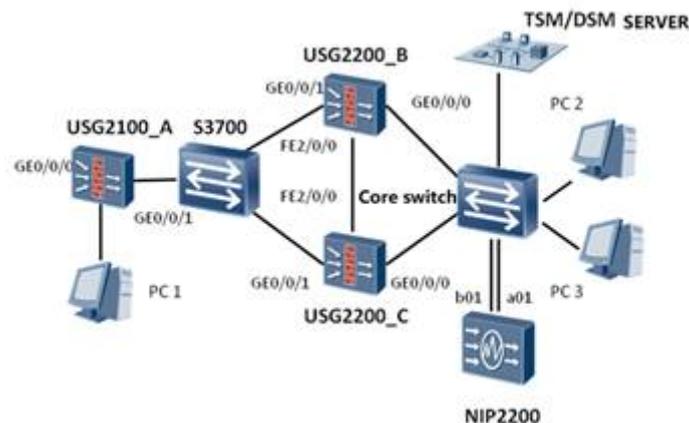


Figure 1 Topology of Network Security in Data Communication and Security Technology Training Room

#### 3.2 Data Storage and Cloud Computing Technology Skills Training Device

Data Storage and Cloud Computing Technology Training Room combines data storage technology and cloud computing technology to meet the teaching and training needs of Huawei Certification Course HCNA-Storage and HCNA-Cloud. It consists of Huawei latest generation of application servers, disk storage arrays, storage systems, ethernet/optical switch, Mini VDI cloud computing integrator, TC terminals and other connecting components.

Support file management, Rain disk array partition, dual hot standby, storage mapping, multi-path configuration and other technologies and applications, support cloud computing business

functions such as mirror production, desktop issuance, resource management, storage devices and cloud computing devices can be integrated through network connection settings, with Huawei products and HCNA certification courses, to produce the best teaching effect.

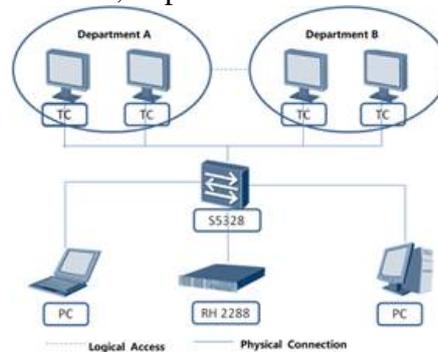


Figure 2 Topology of Cloud Computing in Data Storage and Cloud Computing Technology Training Room

### 3.3 Video Communication Technology Installation, Debugging and Training Device

Video Communication Technology Training Room combines video communication technology and video surveillance technology to meet the teaching and training needs of Huawei Certification Course HCNA-VC and IVS. By the latest generation of Huawei application server, network sphere camera, network gun camera, network hemisphere camera, encoder, analog camera, TC terminal and other connecting parts, the video equipment and video surveillance equipment can be integrated through network connection, which can cooperate with Huawei products and HCNA certification courses to produce the best teaching effect.

### 3.4 Broadband Access Network Technology Skills Training Device

Wireless technology has the advantages of fast deployment, easy maintenance, easy access, neatness and beauty. It is gradually used in large-scale businesses, such as residential WIFI, hotels, mines, oilfields, aviation and as access points for networks of operators.

## 4. Summary

ICT personnel training in higher vocational colleges should not only take into account basic theory, but also keep abreast of the times, so that students can master new technologies and new products in the field of ICT. By cooperating with Huawei Company and introducing excellent teaching resources from Huawei, our university has initially constructed an ICT talent training system suitable for application-oriented colleges and universities, and has achieved phased results in the practice of ICT talent training. In the future, our school will keep close contact with ICT enterprises, introduce the latest technology development in the field of IC technology into daily teaching, and train more ICT talents to meet the needs of society. [3-4]

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