

# The Innovation of Computer Network Cloud Computing Talent Training Mode under the Background of 1+X Course Certificate Integration

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**Abstract:** The changes in the social development environment have put forward new requirements for talent training in higher vocational colleges. This paper analyzes the problems faced in the current talent training process, and proposes a talent training model of "integration of job, course, certificate and competition", which integrates the real project of the enterprise, the ability requirements of vocational qualification certification and vocational skills competition into the curriculum. It is of great significance to improve the quality of cloud computing talents training for computer network technology majors and to accelerate the construction of a modern vocational education system so that students have skills that match the needs of future occupations.

**Keywords:** Integration of course certificate, Talent training, Higher vocational education.

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## 1. Introduction

As my country's social economy has entered a period of normalized development from a period of rapid development, and changes in the general environment of social development have put forward new requirements for talent training in higher vocational colleges. In January 2019, the State Council issued the "National Vocational Education Reform Implementation Plan" (hereinafter referred to as "20 Vocational Education Articles"), which proposed to "promote the construction of qualifications framework, and explore the connection between academic certificates and vocational skill level certificates. Higher vocational colleges In order to continue to play the main role of vocational and technical personnel training in the new era, it is necessary to reform the current talent training model of higher vocational colleges. The introduction of 1+X certificate system in higher vocational colleges is based on the new educational environment. With positive changes, it will further improve the quality of talent output in higher vocational colleges, as well as the ability to serve the society, and achieve sustainable development of higher vocational colleges.

The advantage of the 1+X certificate system is to break the single academic system, so that students can not only obtain academic certificates, but also obtain "X" vocational skill grade certificates through education in higher vocational colleges. As far as students are concerned, it is the certificate of their professional skill level, the student's learning achievement, and the important certificate for students to go to the society and obtain job resources.

## 2. Analysis of Talent Training Problems

The 1+X certificate system not only amplifies the learning outcomes of students in higher vocational colleges, but also reflects the characteristics of vocational education. The job attributes of education reflect the adherence to the career-oriented school-running philosophy, which can further improve the future job competitiveness of students in higher vocational colleges.

However, most of the current higher vocational colleges have not established courses integrated with the X certificate system for the 1+X certificate system in terms of professional curriculum setting. There are mainly the following problems:

1) In order to obtain a certificate, students need to participate in special training. The main way for students to obtain certificates is to participate in special training and pass relevant vocational skills appraisals. The hours of students participating in training are not included in the hours of students' course study, nor are they counted as student credits.

2) Dispersion of professional knowledge and skills related to certificates. Taking the intermediate certificate of cloud computing platform operation, maintenance and development as an example, students need to study courses such as "LINUX Operating System", "Cloud Computing Basic Platform Construction", and these courses are distributed in 2-4 different semesters, and they are not connected. It is compact, resulting in "fragmentation" of knowledge content, "fragmentation" of knowledge structure, and ineffective superposition of knowledge points. The teaching and training effects are difficult to meet the requirements, and it is very difficult for students to obtain certificates after completing the courses involved.

3) The complex of professional knowledge and skills is not strong. Under the 1+X certificate system, vocational education creates compound skilled talents, and the training goal is to cultivate high-skilled talents who can adapt to various types of jobs. This requires students to have the integration of theory and skills, and the coordination of knowledge breadth and knowledge depth. ability. Under the traditional curriculum system, students can only complete the course credits step by step to meet the graduation requirements, and can only obtain a graduation certificate. Although a vocational skills certification link is also set up, it still remains in the form of "dual certificate" and can only take online exams. Engineer or network administrator certificate. In terms of the breadth of professional knowledge, it is difficult for students to achieve inter-professional learning, to obtain "X" skill level certificates, and to meet the needs of compound skilled talents.

In view of the current situation of the separation of courses

and certificates in higher vocational colleges and the difficulty of integrating course certificates, if we want to continue to play the role of the main position of vocational and technical personnel training in the new era, we must reform the current talent training model and establish a model that is compatible with 1+ The "Course Certificate Fusion" model that matches the X-certificate system.

### 3. Innovation Path of Talent Training Model

According to the pilot requirements of the Ministry of Education on the "1+X" certificate system, the pilot requirements for cloud computing platform operation, maintenance and development certificates, vocational skill level standards and professional talent training goals, curriculum systems, curriculum standards, and teaching reforms are integrated and integrated, and teachers Team building, training base building, etc. are closely integrated, promoting the organic connection of "1" and "X", forming a talent training model of "course certificate integration", in order to cultivate cloud-oriented Internet and related services, software and information technology service business. Occupational group of computing engineering and technical personnel, high-quality technical and skilled personnel who can be engaged in cloud computing system deployment and operation and maintenance, cloud resource management, cloud application and service, cloud computing application development, etc. Combining talents to play an exemplary role, improve the quality of vocational education and students' employability.

The vocational-oriented "course certificate integration" talent training model refers to the integration of vocational examination projects into the professional personnel training plan, so that the training objectives of professional personnel are unified with the requirements of occupational positions, and the teaching content is consistent with the content of vocational examinations and the requirements of occupational positions. It is a high-quality application-oriented talent training model that enables students to achieve "dual certificates" or even "multiple certificates" when they graduate, and achieve full employment and high-quality employment goals. Design a career-oriented "course certificate integration" talent training plan, optimize the curriculum system, incorporate the cloud computing platform operation and maintenance and development vocational skill level certificate into the skill requirements, standardize and improve the quality of training with research as an objective standard, and establish relevant courses. teaching requirements.

Its design ideas include:

(1) Investigate job target groups such as cloud computing platform construction, cloud resource management, cloud applications and services, cloud computing application development, etc., and determine typical positions such as cloud computing system deployment and operation and maintenance, cloud computing application development and services, etc.;

(2) Use occupational positions to locate talent training goals, and consider the sustainable development of students after employment;

(3) Describe the talent specifications with the job professional ability, focusing on what students can do;

(4) Integrate the academic certificate and the post

occupation certificate, and integrate the occupational quality, occupational ability and professional knowledge requirements of the occupational examination into the professional courses.

Through the analysis and research on the demand for talents in the computer network cloud computing industry, the occupational positions and abilities are clarified, and a professional curriculum system oriented to job positions, enterprise design tasks and project modularization is constructed.

#### 3.1. Research on Talent Demand Based on Cloud Computing Industry Chain

According to the "2020 China Cloud Computing Industry Development Research Report" and "2020 Cloud Computing Market Development White Paper" and shows, in 2019, the global cloud computing market represented by IAAS\PAAS\SAAS reached 188.3 billion yuan, with a growth rate of 20.86%. And continue to grow rapidly at a rate of at least 18% per year, and the market size is expected to exceed \$350 billion in 2023. As shown in Figure 1 below.

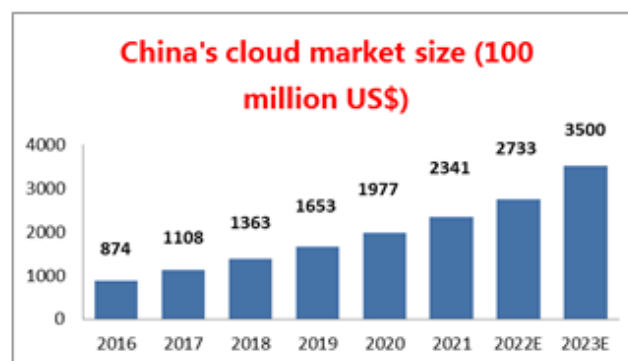


Figure 1. China's cloud market size

In 2018, the Ministry of Industry and Information Technology launched the "Implementation Guidelines for Promoting Enterprise Cloud Migration (2018-2020)", and domestic enterprises' cloud migration has become an irresistible trend. In 2020, there will be 1 million new cloud companies across the country, creating a demand for more than 1 million cloud computing-related jobs.

Cloud computing has continued to develop rapidly under multiple forces, and the demand for talents has grown strongly. China's cloud computing industry has entered a period of rapid growth. According to the forecast of IDC, an authoritative market research company, since 2018, the overall growth rate of the cloud computing industry is 6 times that of the traditional IT industry. Such a rapid growth rate has made enterprises more interested in talents who meet the needs of industrial development. The demand will show an unprecedented growth trend; in particular, the demand for high-quality industrial talents will continue to expand. According to the statistics and forecast of the Ministry of Industry and Information Technology, the next three years will be a period when the demand for talents in China's cloud computing industry will be relatively concentrated, and the demand for talents in the cloud computing industry will present a gap of thousands of industrial talents every year.

From the perspective of the industrial chain, there is an imbalance between the supply and demand of talents. The talent structure required for the development of the cloud computing industry is mainly distributed in the middle and

lower reaches of the industry chain. One is the middle and senior personnel in software development, design and analysis located in the middle of the industry chain, accounting for about 20%-30% of the total number; Skilled and applied information technology talents in the downstream of the industrial chain account for about 60-70% of the demand, and the supply of talents in the downstream industrial chain is relatively weak.

Cloud computing operation and maintenance positions of cloud computing equipment service companies are more friendly to higher vocational education, and provide a higher proportion and number of jobs; application R&D enterprises have higher educational requirements, but are engaged in operation and maintenance. The proportion of similar jobs is relatively high, and skilled operation jobs such as virtualization deployment engineers and cloud platform operation and maintenance engineers account for 70%.

According to statistics from major recruitment websites, cloud operation and maintenance positions such as platform-level automated operation and maintenance, software-level cloud system operation and maintenance, and hardware-level server operation and maintenance have a large demand for talents. The number of recruits for cloud platform development positions is 11,297, the number of recruits for cloud service development is 11,748, and the total number of cloud development positions is 23,045. The total number of people required for cloud operation and maintenance positions reached 40,419, including 9,164 for automatic operation and maintenance, 12,362 for cloud system

operation and maintenance, and 10,008 for server operation and maintenance.

## 3.2. Build A New Course System and Optimize Course Teaching Content

### 3.2.1. Build A Modular Curriculum System That integrates typical job tasks of "1 + X" positions

According to the training goals and specifications of professional talents, through school-enterprise cooperation, a teaching team is formed with the participation of enterprise technical personnel and full-time teachers to analyze the tasks of professional positions, determine the typical work tasks of the positions, and integrate the typical work tasks. The ability required for work tasks, and a curriculum system based on ability modules is constructed.

Under the organization of the Professional Construction Steering Committee, professional teachers go deep into the front line of enterprises to conduct professional research, reconstruct the curriculum system, and add courses in container cloud technology, public cloud basic applications, cloud host operation and maintenance, etc. to the original curriculum system. Construct a "1+X" curriculum system oriented by "construction, operation and maintenance, and management process". Improve the curriculum standards, take "X" occupational competencies as modules, integrate "X" occupational certificate competency requirements, take typical work tasks as carriers, and design courses based on "1 + X" modularization.

**Table 1.** Typical work tasks in the field of work

field of work	Typical work tasks	"Certificate Integration" Course	Certificate
1. Cloud computing center hardware deployment	server access network device access storage device access	Practical network technology, Data storage and applications	1+X Cloud Computing Platform Operation and Maintenance and Development Grade Certificate (Nanjing 55) 1+X Cloud Computing Center Operation and Maintenance Service Grade Certificate (Lenovo)
2. Cloud service application	Elastic Computing Service Management Cloud Network Service Management Data storage service management	Public cloud theory and practice	
3. Operation and maintenance of cloud computing center operating system	Private cloud platform operation and maintenance Container cloud platform construction Cloud business system Cloud security operation and maintenance	Openstack , Enterprise cloud computing platform construction	
4. Cloud service development	Operation and maintenance script development Cloud operation and maintenance development Cloud service development	cloud application development, Cloud Application Delivery Technology	
5. Cloud Architecture Design	Cloud architecture design for business systems Cloud service architecture design Cloud platform architecture design	Enterprise -level cloud application development project practice	

### 3.2.2. Design the "Course Certificate Integration" Course and Reconstruct the Course System

According to the law of students' cognition and career growth, the professional curriculum system is constructed as shown in Table . According to the results of interpretation and analysis of talent training specifications and 1+X cloud computing platform operation, maintenance and development vocational skill level standards, 1+X intermediate certification is aimed at IT Internet companies, enterprises and institutions, computer equipment manufacturers and

manufacturers, computer system integration, Information technology service enterprises, computer system and operation and maintenance, cloud computing system and operation and maintenance, cloud computing development and service, etc., are engaged in hardware access, application software deployment, hardware operation and maintenance, software system operation and maintenance of cloud computing center, Resource management, service request response processing and other post groups. For these job groups, courses in professional skills courses that are closely

related to vocational skill level standards and whose contents basically overlap or cover are designed as "course certificate integration" courses. For example, courses such as "Enterprise Cloud Computing Platform Construction" and "Enterprise-level Cloud Application Development Project Practice" are integrated with the 1+X Cloud Computing Platform Operation, Maintenance and Development Certification Intermediate Certification. The number of "Course Certificate Integration" courses can be determined according to the training hours required for the vocational skill level certificate.

### 3.2.3. Selection and Reconstruction of Course Content

The selection and reconstruction of course content is aimed at cultivating high-skilled application compound talents.

#### (1) Choice of course content

According to the 1+X cloud computing platform operation, maintenance and development vocational skill level standards, the course content and vocational skills are effectively connected. Pay attention to the combination of humanities and professional technology, infiltrate the content of vocational quality education into professional education, and cultivate students' comprehensive quality.

#### (2) Reconstruction of course content

According to the real project in the actual position, it is transformed into a teaching case, and the case from simple to comprehensive runs through the entire course content, and the knowledge and skills related to the case run through the process of completing the task. According to the "five-step teaching method" of task proposal, knowledge learning, analysis and implementation, task inspection, and communication evaluation, task-driven and project-oriented course content is designed.

### 3.2.4. Construction Credit Bank

Build a "credit bank", build an information management platform for credit recognition and replacement, register and store the learning achievements reflected in academic certificates and vocational skill grade certificates, and include them in personal learning accounts; fully implement the exchange of academic certificates and vocational skill grade certificates, to identify, accumulate and transform learning outcomes.

## 3.3. Build a High-level "Double-qualified" Teaching Team

The computer network technology major takes the construction of leading majors in the academy as an opportunity to build a teacher classification development mechanism. According to the teachers' personal wishes or specialties, choose three directions: scientific research, teaching, teaching and scientific research, and encourage teachers to exert their scientific research ability, education and teaching ability, technical skills and practical specialties in the corresponding direction, and establish three personalities of scholars, famous teachers and craftsmen development path. Actively promote the doctoral engineering and senior talent engineering programs, and achieve at least 3 professional teachers who have obtained doctoral degrees, encourage new teachers to participate in doctoral training, and promote 2 professional titles, and more than 90 % of dual-qualified teachers. And encourage team building, with points to lead, optimize the structure of the teaching staff, and enhance the vitality of the teaching staff.

Improve the level of teachers, through external introduction

and internal training. The teaching team includes not only "double-qualified" full-time teachers, but also "double-qualified" part-time teachers, forming a high-level and structured teaching team that can take into account the needs of professional teaching and skill certification training. Establish a professional part-time teacher expert database, introduce 1~2 off-campus part-time teachers every year, improve the employment and management mechanism of part-time teachers, and introduce front-line engineers from enterprises to provide students with course guidance that integrates learning and practice.

Establish incentive and management mechanisms for team building. According to the task goals and quality requirements of team work, formulate scientific assessment management methods; provide necessary support and funding for teachers to participate in training, undertake tasks, and conduct research, formulate corresponding incentive methods, and establish a long-term self-development mechanism.

## 4. Conclusion

Under the background of 1+X course certificate integration, innovative professional talent training methods are the main theme of the current vocational education reform. The computer network technology major in higher vocational colleges builds a talent training model of "integration of post, course, certificate and competition", breaks the traditional teaching method, takes post, certificate and competition as the carrier, highlights and strengthens practical education, and achieves the integration of "teaching, learning, doing and training" the goal of.

According to the guidelines of higher vocational education, re-analyze and locate the service object of professional construction, and analyze and determine the service orientation of this major according to the scale of higher vocational education in Wenzhou, the regional cognition of talents in the industry and enterprises, and the employment destination of previous students. Focusing on information enterprises in Wenzhou, it radiates service objects in Zhejiang Province; continuously strengthens industry-university-research cooperation, and strengthens the close connection between professional construction and local industries through various forms of school-enterprise cooperation, teacher scientific research service enterprises, etc. The construction needs investigation, curriculum system reconstruction, enterprise cooperative relationship construction and other work have made the professional construction have a very clear direction and pertinence, and the concept of serving regional industries, enterprises and industries has been concretely implemented.

This paper discusses the innovation of computer network cloud computing talent training mode under the background of 1+X course certificate integration. Strengthen the combination of production, education and research, carry out close cooperation with well-known enterprises in the industry, increase the close connection with local economic construction, and establish a professional construction concept with service as the purpose. Reconstruct the course system, organize course content, implement course teaching, and complete the construction of a brand-new course system and most of the course materials for this major. Build a curriculum system that can cover the needs of information enterprises in Wenzhou for skilled jobs in the field of computer network cloud computing.

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