



The Training and Learning Alternative Course System Based on Qualification Framework of Numerical Control Technology Specialty Group

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Abstract. In order to solve the problem of lifelong learning of multiple students in the numerical control technology specialty group, Guangdong Mechanical & Electrical Polytechnic has established a qualification framework for the specialty group. This qualification framework horizontally includes two types: academic qualification framework and industry qualification framework, as well as seven levels of professional group qualification framework vertically. By clarifying the corresponding relationship between the educational training objectives and the industry job groups at the same level, the results oriented curriculum standards have been developed. The training and learning alternative course system of ‘specialty group platform + course supermarket’ has been designed to solve the problems of achievement certification and interoperability in various forms such as school learning and industry learning. At the same time, online and offline learning platforms and credit banking platforms have been built to facilitate the learning and achievement accumulation of different types of students.

Keywords: Numerical control technology · Qualification framework of professional group · Alternation of training and learning · Curriculum system · Multiple students · Lifelong learning

1 Introduction

With the deepening of vocational education reform, the training objects of Higher Vocational Education in China have gradually expanded from a single source of college entrance examination students to secondary vocational students, modern apprenticeship, and even social students. Different types of students have different learning foundations: college entrance examination students have the best theoretical foundation, but lack skills, while social students have the opposite; Different students’ learning styles

are also diverse: secondary vocational students prefer to learn by doing, while social students are more on-the-job learners; The forms of learning achievements are also different: some are the results obtained from the theoretical examination, some are the skills and experiences obtained through the master's teaching, etc.; The demands of students are also different. For example, enterprise students want to be able to learn anytime, anywhere and better combine with work. Students of different source types have different knowledge reserves, learning abilities, learning methods and learning interests, showing the characteristics of diversity [1]. It is an urgent problem how to solve the problem of lifelong learning for multiple students of numerical control technology specialty group.

2 Concrete Measure

2.1 Build Professional Group Qualification Framework

The qualification framework of the professional group is divided horizontally into two types: the academic qualification framework and the industry qualification framework, of which the academic qualification framework is divided vertically into seven levels [2]. These seven levels are: primary school, junior high school, secondary vocational or technical school, higher vocational school, application undergraduate or bachelor, graduate or professional master, graduate or professional doctor. The industry qualification framework is horizontally divided into seven categories according to the professional fields of the machinery manufacturing industry: product R & D, product manufacturing, product assembly, quality control, product sales, after-sales and enterprise management. Each field is divided into seven levels vertically according to the career growth path. The professional group qualification framework is shown in Fig. 1.

The professional group qualification framework defines the professional group's academic development, industry career development and the integration development path between academic qualifications and industry. At the same time, it also establishes

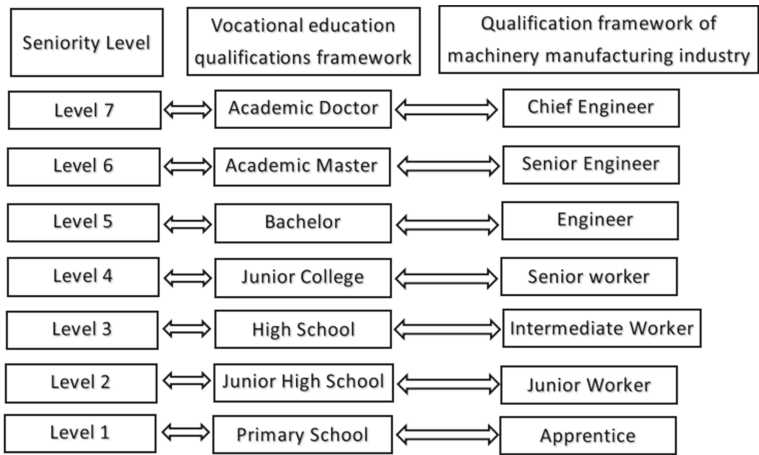


Fig. 1. Professional Group Qualification Framework

a clear learning path of connecting up and down and connecting horizontally. Each level of vocational education has a corresponding relationship with the position groups at each level of the machinery manufacturing industry, so that the training objectives of vocational education at each level of the CNC technology professional group have a clear target orientation.

2.2 Development Achievement Oriented Standard System

Based on the qualification framework of the machinery manufacturing industry, the same level modular capability standard is developed through job task analysis for each level of the industry [3]. With reference to the ability standards and national professional teaching standards, further develop the unit curriculum standards at the same level under the framework of academic qualifications. The unitized ability standard and curriculum standard start with the learning achievement goal and end with the evaluation standard corresponding to the learning achievement, forming a closed-loop standard from achievement to achievement. Therefore, whether it is academic or non academic training, not only can we know what to learn through unit module learning, but also the results can be easily certified. Because the curriculum standards are formulated with reference to the competency standards, the correspondence and intercommunication between the academic courses and the industry competency standards are formed, as shown in Table 1.

Table 1. Correspondence table of some main courses and competency standards of specialty groups

Capability Standard Unit		Subject Courses			
		Three coordinates and detection technology	Computer Aided Design And Manufacturing	NC Matching Process	CNC Vocational Skill Level Certificate
CNC Senior Worker	Measure And Draw Part Drawings	√	√		√
	Writing Complex Programs manually			√	√
	Computer Aided Design Advanced		√	√	√
	Computer Aided Programming Advanced			√	√
	NC Turning Of Complex Parts			√	
	NC Milling Of Complex Parts			√	√

2.3 Design the Training and Learning Alternative Curriculum System of ‘Specialty Group Platform + Curriculum Supermarket’

Referring to the national professional teaching standards, the curriculum system of numerical control technology professional group is horizontally divided into two categories: enterprise training courses and school-based courses. Enterprise training courses design different enterprise training programs according to seven career directions, including development, manufacturing and management, and simple to complex training rules. The school-based courses are divided into four major directions according to their majors: mechanical design and manufacturing, mold design and manufacturing, numerical control technology, mechanical manufacturing and automation. It is vertically divided into professional group platform courses and professional group supermarket courses [4]. Platform course is a required course, and supermarket course is an optional course [5]. The work study alternation training mode shall be adopted for the general training mainly inside the school and the apprenticeship training mainly outside the school. The training courses for general training enterprises and theoretical courses in the school are conducted alternately at the ratio of 3:7 per week. For example, 1.5 days of enterprise training courses and 3.5 days of theory courses per week. Out of school apprenticeship training shall be conducted according to 6:4. This curriculum system realizes the dual integration of on campus learning and enterprise learning, and connects on Campus Training and off campus training. Enterprise training courses can be placed in enterprises or schools and undertaken by part-time teachers of enterprises. It not only meets the needs of the combination of education and training, but also is more suitable for the learning needs of different types of students. The alternative training and learning curriculum system of ‘specialty group platform + curriculum supermarket’ is shown in Fig. 2.

In the first academic year, students get through the teaching of all majors in the professional group, and jointly learn platform courses and basic technical skills. In the second and third academic years, students mainly choose courses. In addition to the

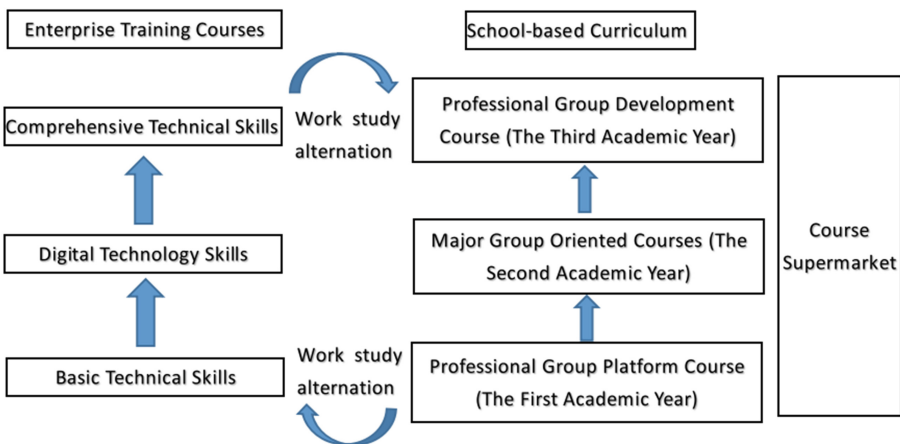


Fig. 2. Training Learning Alternation Course System Of ‘Specialty Group Platform + Course Supermarket’

backbone courses of their major, each student can also choose courses of other major directions. For the off campus training, the students can be exempted from the corresponding course credits according to the regulations after the skills they have obtained have been identified.

2.4 Build an Online and Offline Learning Platform

Establish offline learning outlets in regions and leading enterprises with concentrated enterprises in the machinery manufacturing industry. It provides convenience for students' off campus internship and apprenticeship training through door-to-door teaching and school enterprise cooperation, and solves the problem of easy learning everywhere. At the same time, we will work with enterprises to build an online virtual simulation experiment training room and an online learning platform, jointly develop teaching resources, and solve the problem that learners are easy to learn from time to time.

The online learning platform provides learners with course standards, learning resources, evaluation standards, assignments, examinations, Q & A, discussion and other materials and learning space. According to the "online" learning situation of students, teachers let students choose independent inquiry learning or collaborative learning according to their learning ability or teachers' suggestions in the way of task leading. At the same time, personalized tutoring will be conducted according to the online learning diagnosis and offline learning progress of each student.

2.5 Certification and Accumulation of Achievements

Diversified students have diversified learning methods and learning outcomes, so the certification, accumulation and transformation of learning outcomes are more important [6]. The specialty group has formulated a credit system reform plan to promote the reform of teaching management systems corresponding to the credit system, such as registration, course selection, fees, student status, and course certification. Learners are allowed to learn and accumulate credits through different channels, such as inter school learning, online learning, autonomous learning, and even learning at work. At the same time, the system of recognition, accumulation and transformation of achievements has been formulated.

In addition, relying on the Credit Bank of Guangdong Open University, it provides a platform for students of different source types to recognize their learning achievements, accumulate and convert their credits. After registering on the platform, students can upload relevant learning achievement supporting materials, and obtain corresponding credits after being certified by relevant personnel.

3 Conclusions

After years of practice, the course system has been extended to the training of modern apprenticeship, the training of expanded enrolment, the recognition of enterprise personnel's ability level and overseas training. 4 national and 36 provincial awards in the student competition; In the past five years, the employment rate has exceeded 98.5%

and the professional counterpart rate has reached 88%. The training mode of specialty groups has been extended to the whole school. The school has successfully applied for 8 provincial specialty groups in the first batch, and the number is in the forefront of the province.

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