



Research on the Construction of Teaching Standards for Undergraduate Vocational Education of NC Technology Specialty Group

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Abstract. By analyzing the job division and job levels in the manufacturing industry, this paper determines the school running orientation, training objectives and teaching mode of undergraduate level vocational education in the NC technology specialty group. On this basis, the post group ability standard of undergraduate level vocational education of NC technology specialty group is constructed. Finally, the teaching standards and curriculum system of undergraduate level vocational education for NC technology specialty group are developed. The construction of teaching standards ensures the talent training of undergraduate level vocational education of NC technology specialty group. The teaching standards have not only promoted the smooth development of the pilot work of vocational education at the undergraduate level in China, but also accelerated the training of high-level technical and skilled talents.

Keywords: Numerical control technology professional group · Undergraduate level vocational education · Teaching standard · Curriculum system

1 Introduction

As an important part of the national education system and human resources development, the status and role of vocational education can not be ignored. With the change of China's economic structure, the economic development model based on complex and cutting-edge technology will inevitably need a large number of compound, innovative and developmental high-level technical and skilled talents. The higher vocational education at the college level can not meet the needs of China's economic development for high-level technical and skilled talents, and the development of undergraduate level vocational education has become inevitable [1].

As China's undergraduate level vocational education is in the exploratory stage, the specific differences between the talent training objectives of manufacturing undergraduate level vocational education and those of ordinary undergraduate education and college level higher vocational education have not been clarified, especially the lack of teaching standards of manufacturing undergraduate level vocational education [2]. On May 27,

2019, the Ministry of Education officially announced the establishment of 15 vocational universities. The development of vocational undergraduate education has become the focus of the improvement of the vocational education system. In the context of the construction of vocational education system, domestic higher vocational colleges have also begun to explore undergraduate level vocational education.

The numerical control technology professional group is composed of four majors: Numerical Control Technology, Mold Design and Manufacturing, Mechanical Design and Manufacturing, Electromechanical Integration Technology. It mainly serves the precision mold intelligent manufacturing industry in Guangdong-Hong Kong-Macao Greater Bay Area. First of all, the rapid development of undergraduate education and professional skills training system must be beneficial to the rapid development of undergraduate education and professional skills, which is conducive to the realization of the basic standards of undergraduate education.

2 Thoughts on the Construction of Teaching Standards for Undergraduate Vocational Education

By analyzing the manufacturing chain, post division and level of the manufacturing industry, this paper constructs the post group ability standard of the undergraduate level vocational education post of the NC technology professional group, so as to construct the undergraduate level vocational education teaching standard and its curriculum system of the NC technology professional group, and develop the core curriculum standard of the undergraduate level vocational education of the NC technology professional group, which will be implemented in practice.

2.1 Determine the Training Level

According to the grade standard of Guangdong lifelong education qualification framework (DB44t 1988–2017), the types of vocational education are divided into seven levels, secondary vocational schools are at Level 3, undergraduate schools are at level 5, and higher vocational schools are at level 4. The lifelong education qualification framework in this standard (see Fig. 1) is the standard of training level positioning. The training target post group is determined according to the level, and the corresponding level courses are developed through the ability analysis of the post group [3]. On the basis of enterprise research, we need to further position the undergraduate level of vocational education, determine the detailed requirements of knowledge and ability of undergraduate level of vocational education, and also provide support for the division of undergraduate level of Vocational Education in job groups.

2.2 Establish Professional Ability Standards and Teaching Standards for Undergraduate Vocational Education

Through the analysis of each post and post undergraduate level in the production chain of the manufacturing industry, the undergraduate level ability standard of the enterprise post group in the manufacturing industry is established, so as to clarify the division

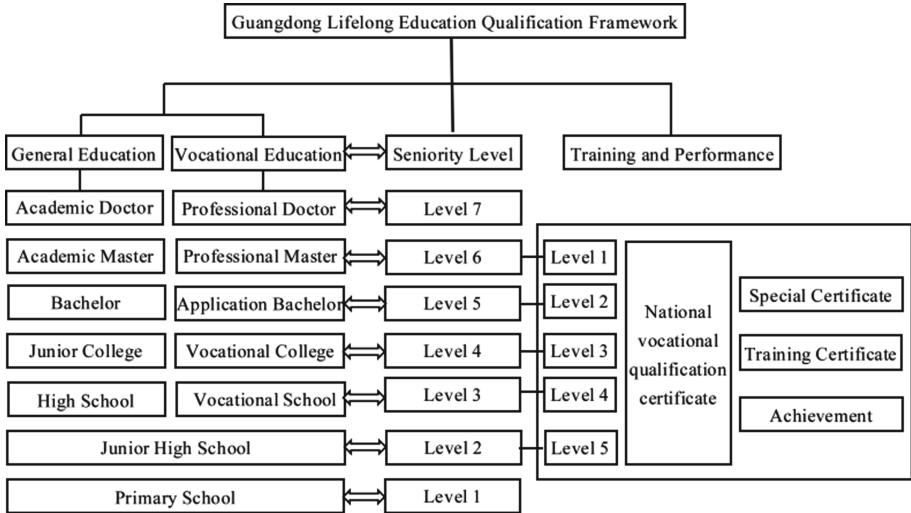


Fig. 1. Lifelong Education Qualification Framework (The picture is from the grade standard of Guangdong lifelong education qualification framework).

basis of the professional group, the relationship between the production chain and the professional group, and the relationship between the corresponding post groups of each specialty in the professional group [4]. This relationship establishes a reference basis for the establishment of the professional platform courses of the professional group and the core courses of the professional direction. After investigation, the main jobs of the professional group are product R&D Engineer, material experimenter, mold manufacturing, mold design, 3D printing Engineer, mold debugging and mold production management. Graduates have gone through the career growth stages of apprentices, skilled workers, team leaders, technical directors, technical managers, enterprise executives, industry experts, etc. from the beginning of the internship period to several years after graduation. Correspondingly, after widely soliciting the opinions of various enterprises of Guangdong electromechanical vocational education group and secondary and higher vocational colleges, we have established the basic, higher The vocational ability standard of secondary vocational education requires that the graduates of this major can meet the vocational ability grade standard of undergraduate education. The professional ability analysis of product R&D Engineer is shown in Table 1.

Establish the post group ability standard of undergraduate level vocational education posts of NC technology specialty group, so as to lay the foundation for the construction of undergraduate level vocational education teaching standard and curriculum system of NC technology specialty group.

2.3 Constructing Group Curriculum System

According to the ability standard system of enterprise post group in manufacturing industry, establish the undergraduate level vocational education curriculum system of NC technology specialty group. Each specialty of the specialty group can select some courses

Table 1. Analysis of professional ability of product R&D Engineer

Professional Field And Professional Ability			
Professional Post	Professional Ability		Job Requirements
	Should Know (Knowledge)	Should Master (Professional Skills)	
Product R&D Engineer	1. Master the basic knowledge of metal materials and polymer materials. 2. Familiar with the physical and chemical properties and application properties of common metal materials and polymers. 3. Master the processing technology of materials.	1. Proficient in AutoCAD, CATIA, NX and other drawing software. 2. Be able to formulate the processing process card of specific materials. 3. Be able to use basic processing equipment for product trial production.	This position is mainly responsible for developing new materials and products with better performance. Job requirements graduates must have very solid basic knowledge of material science, material design ability and excellent innovation ability.

to form the professional curriculum system according to its own undergraduate level training objectives. The development of curriculum categories in the curriculum system of professional groups not only considers the objectives and characteristics of each major, but also considers the relationship between different majors [5]. It is necessary to study the development method of this curriculum system. The curriculum system of the specialty group focuses on establishing the shared platform courses and core courses of each specialty of the specialty group according to the relationship between the post group, and the connections and differences of each specialty have been established. At the same time, communication with other types of education should be taken into account and communication courses should be set up.

Develop corresponding curriculum standards for the core courses of each major in the curriculum system of the professional group of vocational education at the undergraduate level. On the basis of the research on the teaching standards of vocational education at undergraduate level, further improve the formulation methods of core curriculum standards. It focuses on solving the relationship between post required knowledge and teaching knowledge. It is necessary to further decompose and expand the knowledge according to the needs of students' development ability, and establish the communication between vocational and technical education and training, and general education at the curriculum level.

The next step is to establish the implementation standards for the professional courses in the professional group. The curriculum implementation standard takes the enterprise project resources as the center to construct the work tasks, and takes the work process as the reference to form the teaching process. Develop teaching project resources according to the production chain of manufacturing enterprises. The ability requirements and knowledge requirements of the curriculum standards are decomposed into the teaching tasks of the curriculum implementation standards. Establish an implementation plan

for teaching evaluation of core courses in line with the characteristics of vocational education at the undergraduate level in China.

3 Conclusions

Developing undergraduate vocational education is a necessary measure to give full play to the advantages of vocational education and improve the level of skilled talents. Higher vocational colleges have a very close relationship with local industries, and have a deeper cooperation in the field of resource sharing and scientific research, which has played a great role in promoting the development of local industries and the demand for talents. Higher vocational colleges have established in-depth cooperation with relevant local enterprises and industry associations through the integration of production and education, such as student internship, apprenticeship training, enterprise technical services, skill training, etc. According to the data of Guangdong Education Department, 76% of Higher Vocational Colleges in Guangdong Province participate in the pilot work of modern apprenticeship system, with the largest scale in China. In 2021, Guangdong Higher Vocational Colleges received 420 million yuan in technical services and generated 1.48 billion yuan in economic benefits. Graduates who are jointly trained by schools and enterprises respond quickly to the information of enterprise job demand and technical skills innovation. The construction of undergraduate level vocational education of NC technology specialty group needs continuous practice and exploration, looking for the training mode of vocational education undergraduate talents suitable for local industrial development, creating a highland for the training of high-level technical talents, meeting the urgent needs of relevant industries in the manufacturing field for high-level technical talents, and helping the smooth transformation and upgrading of the economy of Guangdong, Hong Kong and Macao Bay area.

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