Research on the Construction of Curriculum System of Secondary and Higher Vocational Education for Numerical Control Technology Specialty based on Professional Ability Training

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Abstract
The emphasis of numerical control technology education is the mastery of NC technology knowledge and skills. In this paper, the author analyse the construction of curriculum system of secondary and higher vocational education for numerical control technology specialty. The key link between secondary and higher vocational education is the convergence of curriculum system, which is the core of the coordinated development of vocational education. Building a common evaluation system will help to coordinate the development of secondary and higher vocational education.

Key words: Numerical control technology, Skill test, Vocational school, 3D part modeling

1. INTRODUCTION

At present, China's manufacturing industry is facing severe challenges of "two-way extrusion" between developed countries and other developing countries. Focus on the construction of manufacturing power, consolidate and challenges into opportunities, seize the manufacturing industry a new round of competition, need a group of skilled talents, quality, training standards, training levels are put forward higher requirements on the cultivation of our country occupation education talents. This requires secondary vocational school students to further accept higher vocational education to improve their skills and professional quality. At the same time, the enrollment of higher vocational colleges has shrunk in recent years, which has also expanded the enrollment for Higher Vocational colleges. The connection between secondary and higher vocational education has adapted to the common needs of society, students and higher vocational colleges, and its implementation is imperative. However, due to the differences in the system, mechanism and the level of development of different institutions, there are some difficulties in the connection between secondary and higher vocational education. This paper takes a school numerical control technology specialty as an example, analyzes the problems in the connection between secondary and higher vocational education, and explores relevant countermeasures for reference.

From the course of the development of China's occupation education, two different levels of Vocational and vocational education belongs to the occupation, but the country has a high degree of similarity in the occupation education training objectives define two different levels on the vocational education is to cultivate comprehensive occupation ability in high-quality workers and skilled talents in production, service work; higher vocational education is to cultivate high-quality skilled talents to the forefront in higher vocational talents training, there are some differences in the target definition, but vague boundaries and lack of continuity, as by CNC technology professional research in the training objectives of higher vocational education are emphasized in positioning operation and programming numerical control equipment, but no specific boundaries and the target continuation. Occupation ability refers to a person in the subjective conditions related competent occupation activities, is the individual in the execution or completion of one occupation activities or fully adapt to the specific performance of the special conditions of a occupation activities in the external form is also a person with the relevant occupation accomplishment. Generally speaking, professional ability can be decomposed into the professional ability, method ability and social ability necessary to engage in a professional activity. Therefore, it is the key to effectively train the high tech talents in the effective vocational education based on the professional ability of the curriculum of numerical control technology in Vocational and technical colleges.

2. CONTROL TECHNOLOGY COURSES

The key link between secondary and higher vocational education is the convergence of curriculum system, which is the core of the coordinated development of Vocational Education in secondary and higher vocational education. The curriculum of higher vocational education is geared to the job position, which originates from the analysis of typical post tasks. Secondary vocational education and higher vocational education have the same goal, which is to train skilled personnel for all walks of life. The secondary vocational school stresses the
training of operating skills and post talents, while the higher vocational education stresses on the training of technical and skilled talents. Therefore, the key to formulate the training program of higher vocational talents is to set up the linking courses which are compatible with the demand level of talents ability and the ability of industry and enterprise. In the higher vocational education system cohesion is the basic knowledge of learning field curriculum professional learning courses in the field of cohesion, cohesion, cohesion, the professional development of professional core curriculum courses in the field of cohesion, cohesion, occupation literacy curriculum training system, teaching methods and teaching evaluation and other aspects of cohesion. In accordance with the spiral learning rules of knowledge and ability, the curriculum modules of secondary and higher vocational education should be geared to the position to form a cohesive curriculum system, and the connection of the core courses must be the core of the curriculum system.

The curriculum system of Higher Vocational NC technology is based on professional research, analysis of typical tasks, enterprise core work ability of industry and enterprise qualification requirements in higher vocational construction, respectively to determine the core ability and core curriculum. CNC machine tools have been widely used in machinery manufacturing enterprises, equipment control rate of 37%. CNC machine tool manufacturing enterprises usually have different types and grades of CNC machine tools, including low-grade CNC lathe, CNC milling machine, machining center machine tool used in large quantities, less high-end CNC machine tools. CNC machine tool processing is an important guarantee of product quality, is the key process in product processing. The normal production of CNC equipment needs to have the professional skill of the corresponding talent demand, different levels of ability of enterprises, the need for CNC machine operator, CNC machining technology technician, CNC machine maintenance technician. The operator can post operation of CNC machine tools and machine tool maintenance, have blueprint technology literacy, simple geometry processing programming and machining quality control ability, knowledge structure with CNC machine tools; CNC technology in addition to post operation post capability, but also have a product machining process planning, 3D surface programming and processing ability; CNC equipment maintenance jobs need to understand the operation of CNC machine tools, CNC machine tools need more familiar mechanical and electrical control structure, using NC technology, maintenance of CNC machine tools and NC machine tool fault diagnosis and repair. These three types of posts are the core jobs of machinery manufacturing enterprises. The operation of the typical job tasks of NC machine tool parts drawings and technical documents reading and preparation before processing, processing operation of CNC machine tools, adjusting the process parameters, control the quality of processed products; NC technology, CNC equipment maintenance technician at work are drawing analysis, development, design and technology process tooling fixture design, 3D modeling design and process planning, automatic programming and operation of CNC machine tool debugging process, product quality analysis and control, fault diagnosis and maintenance of CNC machine tools, machine tools, electrical installation and testing of the accuracy and recovery. The core job task into learning situational learning courses, vocational training operation and the processing capability of CNC machine tool to determine the core competence, the core competence of Higher Vocational NC process technician, CNC equipment maintenance technician to determine the training ability in Higher Vocational education.
3. PROBLEMS EXISTING IN THE CONNECTION BETWEEN NC MAJOR AND SECONDARY VOCATIONAL EDUCATION

3.1 LACK OF DIFFERENCE AND CONTINUITY

From the course of the development of China's occupation education, two different levels of Vocational and vocational education belong to the occupation, but the country has a high degree of similarity in the occupation education training objectives define two different levels on the vocational education is to cultivate comprehensive occupation ability in high-quality workers and skilled talents in production, service work in Higher Vocational Education in talents cultivation. There are some differences on the definition of objectives, but vague boundaries and lack of continuity, such as through the research of numerical control technology specialty in higher vocational education, personnel training target in the emphasis on the operation and programming of CNC equipment, but there is no specific target and continue its boundaries.
Due to the lack of unified organization and coordination among the higher vocational colleges, the curriculum development still follows the discipline model. In higher vocational colleges, curriculum, teaching material compilation and selection, teaching resources development and use of their own ways, lack of communication. Research and Exploration on the development of secondary occupation colleges lack of curriculum in higher vocational colleges, the actual needs less regard secondary occupation education reform course in the curriculum, mostly according to the structure mode of professional disciplines is self-contained, and ignore the correlation between vocational docking, mainly in: the lack of a unified curriculum standards and textbooks through. In 2014, the Ministry of education formulated secondary vocational school professional teaching standards (Trial) for secondary vocational education in China, and gradually implemented in secondary vocational schools. It clearly stipulates the scope of training, the specifications of talents, the curriculum and requirements as well as the matching conditions of experiment and training. However, there is no unified scheme for the professional standards in higher vocational colleges, and each vocational college is fragmented and independent construction. Both are in the NC professional vocational mechanical drawing, mechanical foundation, CAD/CAM and NC machining of the same or similar professional basis, professional and technical courses, and courses of computer application foundation of this, many higher vocational curriculum content, did not consider the delivery department between customs, repeated contents, not only a waste of time for students to learn, but also seriously affected the enthusiasm of the students. The curriculum lacks clear difference positioning and continuity of cohesion, which brings a lot of problems for the following connection.

3.2. Lack of unified planning and reasonable overall planning

The higher occupation education innovation and development action plan (2015-2018) pointed out: "the examination and enrollment, standardize the implementation of higher occupation colleges in the college entrance examination based on separate examination comprehensive evaluation of enrollment, enrollment, graduates of vocational skills for examination and enrollment, enrollment in higher vocational skills and talents through direct admissions." This makes the proportion of secondary vocational students in Higher Vocational Colleges expanding year by year. However, the current vocational school or vocational colleges mainly through the organization by the examination of time, but there are the following problems: in the specific examination is divided into "cultural quality + Occupation Skills", the cultural quality is divided into "the theory exam" + "professional theory test", the total score is 300 points, "cultural quality" 200 points, "occupation skill" accounted for 100 points. In vocational schools, professional teaching standards gradually unified, vocational school students' learning in Vocational stage of professional theoretical knowledge and professional skills are gradually standardized, but the higher vocational colleges in the recruitment examination and the theoretical difference between skill test content, which led to some secondary vocational schools to meet a vocational school enrollment and professional theory with the emphasis on learning professional skills. The main skills of CNC technology professional students in Vocational stage as the turning and milling technology, but in the examination of the skill test, these two skills test need to have the appropriate equipment for support, also need to spend more time to organize. While some of the higher vocational colleges for training equipment limited, also because the organization or spend too much money and manpower, often by independent decision skills test content and simplify the skill tests or deviate from the theme, to replace other skills, such as the use of electrical wiring instead. And not in the skills test strictly, take form of arbitrariness, which leads to the specific examination mainly in theory test. This organization of professional education in vocational colleges, theory and practice of light weight, so that vocational college students can be divided into "employment class" and "school class" in the implementation of personnel training, in the teaching aspect theory of culture teaching as the focus, on the other hand, according to the professional theory of comprehensive examination of the request for the teaching of specialized courses the core of the practice in the course of operation, to be cut, contrary to the occupation education skills training for the purpose of weight.

4. COUNTERMEASURES OF THE CONNECTION BETWEEN SECONDARY VOCATIONAL EDUCATION AND HIGHER VOCATIONAL EDUCATION

Improve the education system and enrollment policy. In order to achieve the smooth implementation of the link between secondary and higher vocational education, we should change the traditional general college entrance examination and examination methods in the entrance examination, and realize the effective connection between teaching and admission system. According to the actual teaching content, planning examination questions, highlighting professional courses and practice courses, to truly improve the quality of teaching, to test the true level. Secondly, give students more autonomy in higher vocational education, according to the actual situation, the skills competition, comprehensive quality development credits, professional certificate in admission comprehensive assessment standards, make the selection more scientific and reasonable.

Optimization of professional settings in secondary and higher vocational education. Set professional in vocational colleges should optimize to improve the professional structure, curriculum according to the reality of
practice skills in different industries as well as in higher vocational college students, followed by the transformation and upgrading of industry, research in higher vocational education professional scientific and reasonable connection, timely revision of the higher vocational education professional directory, two college students at different levels to form a seamless link in professional links. Higher vocational education professional design is a professional set to teach vocational post depth and expand the extension of Higher Vocational Colleges in the professional setting the width, depth of the close degree in Vocational convergence played a certain effect, so the higher vocational colleges to vocational colleges professional curriculum design in-depth study, effective only the convergence of professional courses, in order to promote the perfect combination of middle vocational education and higher vocational education. In terms of numerical control specialty, professional can butt, can also be “close connection”, for example, the mechanical processing of secondary vocational colleges can butt joint CNC technology.

Figure 4. The development of Vocational Education

Explore the curriculum reform of secondary and higher vocational education to realize the connection of teaching content. In order to realize the continuity and integrity of curriculum content, it is necessary to carry out systematic design, overall planning, key points and curriculum standards in the process of secondary and higher vocational education. Establish a unified course standard is the core of vocational curriculum docking, NC Specialty of secondary vocational education curriculum standards should be based on the requirements of NC industry and enterprises set higher vocational education based on secondary vocational education curriculum standards on deepening and expanding. In the specific teaching content planning, secondary and higher vocational colleges should maintain good communication and interaction, know each other's course content and teaching link, avoid duplication of teaching content.

Give full play to the role of vocational education group and improve the quality of talent training. The development of vocational education should take the government, industry, enterprises, institutions, individuals and other forces, the idea of joint efforts to run schools has been deeply rooted in the hearts of the people. The advantages of group running school not only can realize teaching and industrial integration, but also play a very important role in the docking of secondary and higher vocational education. In NC Specialty as an example, because of technical development is rapid, practical, the implementation of the group of schools, play a scale effect, the accumulating effect in Vocational convergence process, the professional setting, curriculum system, teaching implementation, teaching staff, training conditions, enrollment and employment, continuing education, teaching resources and other aspects of cooperation do a series of work, formed a professional setting, curriculum system and discuss the total order, faculty construction, teaching resources sharing, training base sharing, school enterprise cultural integration mechanism, effectively achieve complementary advantages of each unit within the group to promote common development, from professional enrollment, structure layout, teaching standards and teaching the coordination of teaching facilities, to co-ordinate the use of employment to serve the overall link in Vocational convergence, avoid teaching reality, professional settings wrong Connection, repetition of teaching content, waste of teaching equipment replacement and so on.
5. CONCLUSIONS

To sum up, by numerical control technology specialty as an example, the occupation ability on the basis of the professional courses in higher vocational colleges to implement the integration of construction based on, achieved a strong cohesion teaching in higher vocational colleges, can avoid two kinds of education in teaching content repetition, improve the teaching quality and effectiveness, to meet the the society of highly skilled CNC talents. In higher vocational education focuses on CNC technology professional master of knowledge and skills of numerical control technology, it is necessary to evaluate the theoretical knowledge of CNC technology must be enough master degree, and evaluation of CNC machine operation skills and technical application ability. In higher vocational education has the same goal in the evaluation of academic evaluation, construct the common evaluation system, promote the coordinated development in Vocational convergence, and construct the learning process evaluation system, evaluation system of professional knowledge, occupation skill appraisal system, combined with the necessary skills to test knowledge test, also need comprehensive evaluation reference in the learning process.

Acknowledgements
The 12th Five-Year Plan of Educational Scientific Research in Hebei Province “Research on the Training Scheme of Numerical Control Technology Specialized Personnel Joining Middle and Higher Vocational Education” (1508029).

REFERENCES