

# *Analysis on Key Factors of Connection between Secondary and Higher Vocational Education*

—Taking Mechatronics Major for Example

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**Abstract**—The purpose of this paper is to find out the key factors to realize the true connotation cohesion through the analysis of the existing problems in the connection between secondary and higher vocational education. The existing problems such as lack of continuity and hierarchy, poor and inadequate cohesion of the curriculum systems in the connection between secondary and higher vocational education are the important factors which restrict the quality of vocational education personnel training. Taking mechatronics major for example, the results show that the integration of talents training objectives, systematic specialized curriculum system and practical training, overall and coordinated textbooks are key factors to achieve effective connection between secondary and higher vocational education. The discussion and conclusion may provide reference for the future theoretical and practical research.

**Keywords**—*Mechatronics; connection of secondary and higher vocational; talents training objectives; curriculum system; textbooks construction*

## I. INTRODUCTION

The implementation of connection between secondary and higher vocational education, which can promote the scientific development of vocational education and construct the perfect modern vocational education system, is the foundation of sustainable development of vocational education. So connection of secondary and higher vocational is a problem that must be faced and solved in the development of vocational education. Furthermore, connection of secondary and higher vocational determines whether vocational education can maximize its educational advantages.

The connection of secondary and higher vocational became the focus of the theory research and practice exploration of the modern vocational education system construction. Under the modern vocational education system, how to get implementation of effective connection is the urgent task to China's vocational education technical ability training mode innovation, and the improvement of the quality of higher vocational education, and following the rules of talent growth, and need to adapt to economic and social development industry of high skill talents. Today China's vocational education system construction work has made breakthrough progress.

However, there are still many problems in the connection of secondary and higher vocational, such as poor cohesion and inadequate cohesion of the curriculum system. These problems seriously affect the pace of the construction of the modern vocational education system in our country, which are important factors restricting the quality of vocational education personnel training. To explore connection of secondary and higher vocational, to improve further the quality and level of the connection of secondary and higher vocational, that is the key to secondary vocational school students further study platform, and China's vocational education system structure further perfect, and to meet people on popular choice of the diversity of education, and in order to construct a lifelong education system in our country, and the overall attractiveness ascension of vocational education and the talent demand of the diversification of social and economic development [1].

## II. PROBLEMS EXISTING IN THE CONNECTION BETWEEN SECONDARY AND HIGHER VOCATIONAL EDUCATION IN THE MAJOR OF MECHATRONICS

### A. From the Point of View of Higher Vocational

The lack of continuity and hierarchy between the training objectives of mechatronics technology major in secondary vocational schools and higher vocational colleges, to some extent, has led to the overlap of teaching content and curriculum in secondary vocational schools and higher vocational colleges. Through investigation about dozens secondary vocational schools and higher vocational colleges which have mechatronics technology major, found the curriculum content repetition rate mostly above 50% between secondary and higher vocational education, and some even have the same basic theoretical courses and practical courses. Curriculum repetition means that students entering higher vocational colleges from secondary vocational schools must retake what they have learned. Course content repetition has dampened student's study enthusiasm. At the same time, it also causes serious waste of educational resources and study time. On the other hand, the repetition of the curriculum content makes it difficult to reflect the hierarchical difference between secondary vocational schools and higher vocational colleges. It also can not present the ability progression status of curriculum objectives [2]. Indeed, the high level of skills training in some

higher vocational colleges is not obvious. The graduates who major in mechatronics from both secondary vocational schools and higher vocational colleges are required to get maintenance electrician license. But few of the graduates who graduated from higher vocational colleges get senior maintenance electricians license.

Mechatronics technology develops rapidly, and many new techniques may be appeared every day. This requires specialized courses connection of secondary and higher vocational to keep up with the times. The theory teaching part can supplement the new content in time, but practice teaching is often lagging behind. It causes the theoretical teaching and practice teaching link out of line. For example, "maintenance electrician", one of the mechatronics specialized courses although the use of the grid instead of the previous board to fix components, still only on the grid board, according to the general circuit schematic wiring, but cannot according to the modern enterprise request, chooses the appropriate component to imitate the enterprise production equipment's line installment and the debugging.

There is another obvious problem in the process of the connection between secondary and higher vocational. Higher vocational education has not seriously considered the diversity of students. Some are from secondary vocational schools, and the others are from senior high schools. The former have studied some related courses of mechatronics, but the latter is a blank for mechatronics. At present, there is only one talent cultivation plan of mechatronics, in most of higher vocational colleges, regardless students from secondary vocational school or from senior high school. That is no comprehensive consideration of the student details, students of the two categories, different levels of students according to no difference between the training. In fact, it is also one of the root causes of a series of problems in the connection of secondary and higher vocational that indifference cultivation was adopted for two different levels of students.

#### *B. From the Point of View of Secondary Vocational*

In short, most of the current connection of secondary and higher vocational have not yet reached the depth of the connotation cohesion, more superficial surface connection, many are only professional correspondence, did not reach hand in hand. The secondary vocational school pays more attention to the teaching of practical skills and the cultivation of employability, less foundation, more professional, less understanding, more operation in teaching. Students mostly know how to do it, but they do not understand why they do so. It is difficult for them to adapt themselves to the wider and deeper theoretical study and higher level skills learning after entering higher vocational education [3].

### **III. KEY FACTORS OF THE CONNECTION BETWEEN SECONDARY AND HIGHER VOCATIONAL IN MECHATRONICS MAJOR**

#### *A. Talents Training Objective is the Foundation of Connection between Secondary and Higher Vocational*

According to highlighting problems that talents training objectives was lack of continuity, both secondary vocational

school and higher vocational college should share responsibility for two levels talents cultivation plan of mechatronics construction, build teaching tasks and talents training objectives in different stages, so as to ensure secondary and higher vocational education continuity and relevance. With the guidance of the vocational qualification standards at two levels in secondary and higher vocational education, both training objectives are clearly defined, and the quality promotion and skill improvement in the system of connection education are coordinated. To formulate a relatively independent talent training program in the secondary and higher vocational education stage to ensure that the majority of students can successfully enter the higher vocational education to continue their studies after the completion of secondary vocational education, and there is still a part of the need to choose employment. The aim of secondary vocational education should be to train skilled workers and gradually become technical managers. The aim of higher vocational education should be set up to train technicians and technical management personnel, and gradually become department managers or start their own businesses. The difference between higher vocational colleges and secondary vocational schools is that higher vocational graduates more solid and comprehensive in the professional knowledge, and basic production and management ability level improving, occupation oriented widening, method ability and social ability and innovation ability significantly improving in occupation ability. The establishment of talent training objectives is the premise and logical starting point of the connection of secondary and higher vocational education. It can effectively compile relative scientific curriculum standards by clarifying the talent training objectives of mechatronics.

Mechatronics is an interdisciplinary subject which integrates many disciplines, and is developing towards the direction of intelligence, modularization, networking, micromation and systematization. Focusing on the actual needs of society and enterprises for mechatronics talents in secondary and higher vocational, in consideration of the present situation and problems of connection of secondary and higher vocational. The talents training objectives: to master the basic knowledge of mechanical engineering and automation production lines of the basic working principle, structure, with skilled personnel installation, commissioning and operation maintenance and management ability (for secondary vocational), applied talents(for higher vocational) with technological innovation, technology innovation and learning ability [4]. In the two - stage training process, must clearly distinguish differences between secondary and higher vocational: in secondary vocational schools, we should train the skilled talents facing the production line, in the higher vocational education stage, we should train highly skilled and practical talents integrating management, production and service. Both graduates play different roles in the actual job. The former plays a fundamental role in production, while the latter positions the whole situation and plays a leading role.

#### *B. Construction of Specialized Courses is the Core of Connection between Secondary and Higher Vocational*

The core content of connection between secondary and higher vocational education is the integration curriculum, form

a learning system with professional and vocational knowledge and professional ability, occupation ability of continuous progressive significance, namely "systematic" curriculum system. According to the specific requirements of the characteristics of growth and development of students, the professional teaching and occupation technical skills talent to grow, focusing on professional training objectives system design, overall planning and construction of curricula and textbooks, make clear the teaching points at all stages, formulate curriculum standards, adjust the curriculum structure and content, and promote the organic connection between the specialized curriculum system and the teaching materials. The basic quality courses in higher vocational colleges and secondary vocational schools should be established according to the relevant regulations of the higher education authorities, so as to ensure the necessary quality education in the process of students' growth. The major courses are mainly based on the post ability requirements of graduates from secondary and higher vocational education [5].

At the same time, we should take into account the order of study of professional knowledge, and make full use of the advantages of teaching in secondary and higher vocational schools in order to cultivate professional characteristics of talents. The connection of curriculum system is the bridge between professional post requirements and training objectives of vocational colleges. Aiming at the training objectives of mechatronics major, meanwhile aiming at the curriculum setting and connection of the major, we suggest that secondary and higher vocational schools should aim at two stages objectives. In mechatronics typical tasks for traction, starting from both curriculum connection and curriculum setting adhere to the overall construction, strengthen the cohesion, outstanding system integration and optimization, to ensure the formation of practical and meet the needs and standardize the reasonable and effective connection of curriculum system. The curriculum system is constructed according to improve the occupation ability as the main line in accordance with the spiral, from simple to complex, from easy to difficult.

The curriculum connection design will be carried out in a hierarchical manner. For example, in curriculum connection system of mechatronics major, take "automatic production line installation, debugging and technical reformation" as the big project, in the secondary vocational stage, the installation and debugging of the automatic production line with relatively simple function are completed; in the higher vocational stage, a relatively complicated automatic production line based on high-end PLC technology is installed, debugged and reconstructed. In the higher vocational stage, the curriculum of learning field is developed according to the implementation of the "integration" big project, and the principle is promoted in accordance with the hierarchy. Through the integrated design of the learning field project in secondary vocational schools and higher vocational colleges, the spiral promotion of vocational ability can be achieved.

#### *C. Practical Training and Practice are the Consolidation of Connection between Secondary and Higher Vocational*

In order to ensure the training of high-quality and highly skilled personnel, it is necessary to make reasonable

arrangements for practice teaching. In secondary and higher vocational schools, the whole process of school-enterprise cooperation and work-integrated learning will not only make the curriculum teaching systematic, but also make the vocational skills cultivation systematic. In the secondary vocational school, each semester arranges the specialized practice which not less than two weeks, in the higher vocational school stage each semester arranges three to four weeks specialized practice. During the secondary vocational school, students are encouraged to participate in social practice during the summer holidays, and higher vocational schools are arranged for students to take part in professional practice during the summer holidays. Both secondary and higher vocational must be arranged not less than 0.5 semesters of graduation practice. At the same time, it is necessary to arrange the examination of vocational qualification certificate. At least 1 secondary technical qualification certificates are obtained in secondary vocational education. At least 1 advanced technical qualification certificates are obtained in higher vocational education.

#### *D. Overall and Coordinated Textbooks Construction are the Guarantee of Connection between Secondary and Higher Vocational*

Textbook, as an important teaching resource, is the most specific form of the curriculum. It is the script of the whole teaching process and plays a key guiding role. The construction of textbooks which connect secondary and higher vocational is an important component part of connection between secondary and higher vocational education, and the most basic guarantee for participating in teaching practice directly [6]. The key of textbooks construction is to reflect the school running concept of school-enterprise cooperation and work-integrated learning. On the one hand, the content of textbooks is based on the working process of teaching projects, teaching projects should be an organic unity of knowledge and skills, the embodiment of the teaching method of integration of theory and Practice. On the other hand, the teaching project should be integrated into the professional standards or the content of the industry demonstration, reflecting the latest application of new technologies and process in the industry. We should avoid the repetition, superposition and positioning dislocation of the content of the secondary and higher vocational textbooks according to the different positions of the secondary vocational and higher vocational posts and the target orientation of talents training. The textbooks of secondary vocational school embody the training of basic knowledge and cognitive practice ability. The textbooks of higher vocational embody the training of system knowledge and innovative practice ability. The textbooks of secondary and higher vocational education should be formulated according to overall coordination and coordination, and should be jointly written by key teachers in secondary and higher vocational schools. The education should be market-oriented and strengthen cooperation between schools and enterprises in the connection between secondary and higher vocational. In the process of cooperation, on the one hand, we can understand the needs of enterprises in a timely manner, on the other hand, we can also deepen the understanding of the gap between the two stages of students' technical practical ability, so as to improve the textbooks and

realize the orderly and efficient connection of secondary and higher vocational education.

#### IV. CONCLUSION

This article first analyzes the problems existing in the connection between secondary and higher vocational education in the major of mechatronic. Then the paper study to achieve effective connection of secondary and higher vocational from four sides: talents training objectives, specialized curriculum system, practical training, coordinated textbooks. All studies are based on mechatronics major. At last it is concluded that the integration of talents training objectives, systematic specialized curriculum system and practical training, overall and coordinated textbooks are the key factors to achieve effective connection.

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