

Research on Problems and Countermeasures in Layered Teaching of Mechanical Specialty Linking up Secondary and Higher Vocational Education with Undergraduate Education

Jinling Zhao

College of Mechanical Engineering, Jilin Engineering Normal University, Changchun City, China
522927259@qq.com

Keywords: Linking education; Mechanical specialty; Layered teaching; Problems and countermeasures; Research

Abstract. At present, the linking education between secondary and higher vocational education and undergraduate education is a new subject of higher education in China. How to link up them? What kind of training mode should be adopted to improve the attainment of talent training objectives has become a hot topic of higher education in China. Based on the investigation of the current situation of the linking education between secondary and higher education and undergraduate education in Jilin Province, taking the current situation of 3+4 linking education in Jilin Engineering Normal University as an example, guided by the improvement of students' professional ability, this paper analyses and summarizes the current teaching situation and causes, the necessity of implementing layered teaching methods and practical countermeasures, with a view to providing reference for the linking education of secondary and higher vocational education and undergraduate education.

At the National Working Conference on Vocational Education, General Secretary Xi stressed that "we should strive to create a good environment in which everyone can be successful and make the best use of their talents, and make every effort to give everyone a chance to make a success in life." General Secretary Xi's speech made it clear that the key point of vocational education personnel training is to "make the best of people". This requires that ability training be the main line in the linking education between secondary and higher education and undergraduate education, and constantly explore the teaching methods, methods and means of theoretical and practical courses suitable for the linking education of secondary and higher vocational undergraduates.

Analysis on the Current Situation and Causes of the Linkage of Mechanics Majors In Secondary and Higher Vocational Colleges

The structure of students is complex and their professional qualities are uneven. Taking the undergraduate class 3+4 of secondary vocational school enrolled in our school in 2017 as an example, there are 37 students in this class, 18 from the Technical Teachers College of the 13th Bureau of China Railway in Jilin Province and 19 from Baishan Vocational and Technical School respectively. The former specialty is the application of electromechanical technology, which is connected with the specialty of mechanical and electronic engineering in our college. Although the training scheme of the former specialty has been discussed and discussed seriously, it is due to the teaching methods and courses. A series of links, such as tolerance, connection between theory and practice, and equipping teaching facilities, are not the same, which leads to a great difference in the comprehensive quality of students themselves. Therefore, adopting a one-size-fits-all teaching method can not meet the different requirements of students from different educational backgrounds for curriculum differences.

There is a great difference between undergraduate course offering and student's cultural foundation in middle and Higher Vocational Colleges. For undergraduate education, such as "Higher Mathematics", "General Physics", "Mechanics of Materials" and many other courses, students in secondary and higher vocational schools use their own words "like Tianshu". It is difficult to learn and the passing rate is low. At the same time, some courses in the front and back of the professional education have repeated narration phenomenon, so the original undergraduate curriculum settings are not suitable for the source of undergraduate convergence in secondary and

higher vocational colleges. This is the case. If we copy it blindly, it is difficult to link up the secondary vocational and undergraduate courses.

The existing evaluation mechanism of undergraduate education does not match the quality of students. After decades of exploration and practice, domestic colleges and universities have gradually formed a strict assessment and evaluation mechanism, but it is mainly used for the source of general college entrance examination students. The teaching methods, teaching contents, evaluation, assessment contents and methods do not take into account the characteristics of students in secondary and higher vocational schools, such as poor foundation, weak foundation and stronger practical ability than theoretical learning, so the traditional assessment and evaluation mechanism can not adapt to it. The demand for diversified sources of students.

Lack of professional textbooks matching the level of student's source in secondary and Higher Vocational Colleges. Secondary and higher vocational education is connected with undergraduate education, which is divided into two stages: pre-continuation and follow-up. Therefore, the teaching of the same course can be divided into two stages, one stage is carried out in secondary and higher vocational education and the other part is carried out in undergraduate education. At present, there are no professional textbooks matching this situation and the source level. For example, most secondary and higher vocational colleges choose the course "Mechanical Design Basis". Cheng, as many as twenty chapters of teaching content, belongs to this situation. In addition, the general undergraduate textbooks are too difficult for the students of secondary and higher vocational colleges, so it is necessary to reduce the difficulty to use them.

The Necessity of the Implementation of Hierarchical Teaching

At present, higher education pays attention to student-centered, to improve students ability to work as a guide. It is a difficult problem for higher education how to guide students in vocational schools who have weak theoretical basis, lack of professional ability and lack of planning for their own lives so as to make them become technically skilled talents urgently needed by the society. Hierarchical teaching can take into account individual differences among students, and is conducive to the realization of the overall teaching objectives.

The difference of student's professional foundation is the objective basis for implementing stratified teaching. Students come from different secondary and higher vocational colleges. Because of the different factors such as the choice of teaching content, the control of difficulty degree, teaching facilities, the allocation of teachers and the restriction of admission conditions of students, there are great differences in the cultural basis and professional ability of the same batch of students with the same specialty, which is the most prominent objective factor in the implementation of stratified teaching.

It is difficult to implement stratified teaching in a single class. At present, there are two forms of convergence between secondary and higher vocational education and undergraduate education in Jilin Province. One is undergraduate 3+2 in Higher Vocational education, the other is undergraduate 3+4 in secondary vocational education. The enrollment plan is not large enough. The number of undergraduate students who can be promoted to undergraduate level after examination is also insufficient. The number of students in each class is generally less than 30 after the same group of classes with the same professional direction. Single-class teaching is the main method, so it is helpful for different abilities and different basic students to be grouped into groups and implement stratified teaching. The methods are as follows:

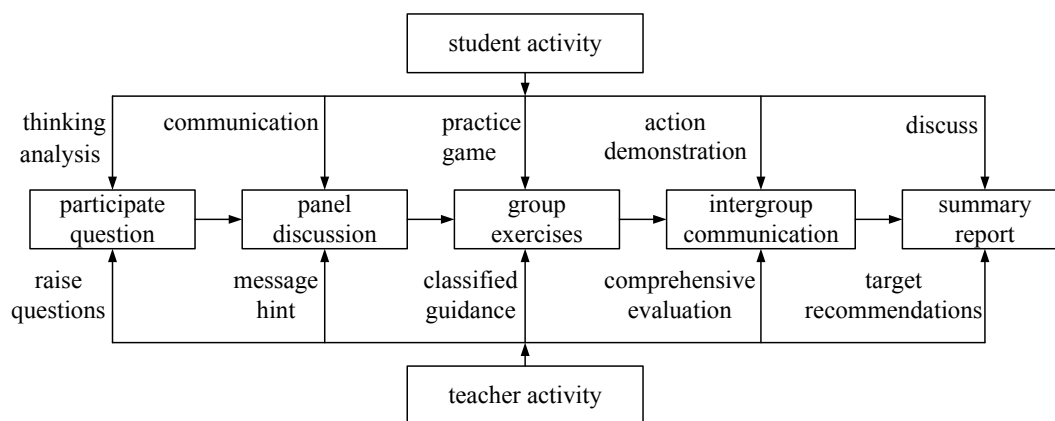


Figure. 1 Hierarchical teaching model

The social demand for talents at different levels is the catalyst for the implementation of stratified teaching. With the introduction of digital science and technology, machinery industry has made great strides in development, and the demand for talents has also changed from traditional processing operators and general engineering technicians to CNC operators and high-tech, skilled and other complex talents. Layered teaching is conducive to giving full play to student's individual advantages, stimulating learning interest and enhancing personal ability. Therefore, the demand for talents at different levels in society is right. The catalyst of implementing stratified teaching for undergraduate students in secondary and higher vocational colleges.

Practical Countermeasure for the Implementation of Hierarchical Teaching

Adhere to the cohesion of curriculum system, strict and unified curriculum standards. Due to the inconsistency of the teaching objectives in the front and back sections of professional education, and the unclear division of teaching contents in the front and back sections of the linking colleges, the curriculum cohesion is either not cohesive or jumping too much, and the depth of the narration is different, resulting in the difficulty of the linking up of the professional courses in the back sections and poor teaching effect. Therefore, the curriculum setting of the connection between secondary and higher vocational education and undergraduate education should present the cognitive law from easy to difficult, step by step, the division of teaching tasks should be clear, the curriculum standards should be unified and implemented effectively in the front and back stages of professional education.

Reforming the Existing Assessment and Evaluation Mechanism. Taking the practical experience of the course "Mechanical Design Basics" with 60 hours and 6 weeks as an example, the percentage system is adopted. The original score consists of 20% of the normal score and 80% of the final written test score. Usual performance includes three parts: attendance, homework and experiment, which form the final summary; the composition of source performance of secondary and higher vocational students is changed to: final written test + in-class assessment + experimental results, which consists of 40% final written test, 30% experiment and 30% in-class assessment. Weekly diary is adopted, that is, 3 points per week, including attendance, class status, homework, group project completion and so on. Practice has proved that the teaching effect is obvious. So it seems that copying the assessment and evaluation mechanism of ordinary students will inevitably lead to a high failure rate and a low degree awarding rate. Therefore, we must reform the existing assessment mechanism, weaken the final assessment to process assessment, and increase the proportion of practice assessment.

Strengthening the Construction of Special Textbooks for Linking up Secondary and Higher Vocational Education with Undergraduate Education. Nowadays, there are many kinds of textbooks for higher education machinery, but few of them are really suitable for the connection between secondary and higher vocational undergraduates. Therefore, teachers should be organized to compile textbooks that meet the actual needs of students and society, and meet the requirements

of higher education, so as to make the content as new as possible and update quickly as possible.

Strengthen the Construction of "Double Teachers" Teachers. The cultivation of student's professional skills is gradually formed through teachers' teaching and student's training. It is necessary to increase the proportion of students' practical links in secondary and higher vocational schools and strengthen the process assessment. Teachers should not only have a solid theoretical basis, but also have a strong practical ability and classroom organizational ability. Only in this way can students of this kind be convinced and guided and standardized. Behavior. Therefore, we should spare no effort to increase the number of "double-qualified" teachers through a series of means such as in-school training, out-of-school introduction, enterprise introduction and school-enterprise alliance.

Conclusion

The purpose of stratified education is to stimulate student's potential and highlight their professional expertise, but the implementation process is complex and complicated, the workload of teacher's increases, the difficulty of teaching materials management increases, the fairness of process assessment and the monitoring of teaching process are not easy to grasp, so stratified education achieves results. Every teaching link should cooperate closely, participate in many ways and cooperate with each other, so stratified education should be implemented in an all-round way. It is not only a question of teachers, but also a systematic project, which needs continuous improvement and innovation.

Acknowledgements

This paper is sponsored by project fund from Leading Group Office of Jilin Provincial Educational Science (Project Title: Research and Practice on the Training Model of Mechanical Speciality for Linking up Secondary and Higher Vocational Education with Higher Education in Jilin Province;

Contract NO. GH170616). In addition, it is also sponsored by the grant from the Higher Education Research Institute of Jilin Engineering Normal University.

Reference

- [1] the Ministry of Education issued the [2012]5 *Ten Year Development Plan of Education Informatization* (2011-2020 years) , 2013.3(In Chinese)
- [2] Lage M J, Platt G J, *The Journal of Economic Education*, (2000), 3 No.11, p.30-43.
- [3] Tenneson M, Mc lason B. Power Point Presentation at Fontbonne University, Missouri Teaching and Learning Mentor Program,2006.
- [4] X.L. Zhong, S.Q. Song and L.Z. Jiao. *Open Education Research*, (2013) No.1(In Chinese)
- [5] <http://www.ceiea.com/html/201501/201007074589.shtml>.
- [6] Gerstein J. *User Generated Education*, 2012.
- [7] Talbert R. *Inverted classroom*[J]. *Colleagues*, 2012, 9(1):7.
- [8] X.J. Deng. *Shandong Normal University*,2015 (In Chinese)
- [9] Q. Ma and L. Li. *Scientific and technological information*, (2014) No.2 (In Chinese)
- [10]Y. M. Zheng. *Information technology education in primary and secondary schools*, (2014) No.2, p.44-47