Continuous Improvement and Practice of Output-Oriented Talent Training Model

Ting Xu, Haiying Fan, Qinxia Zhao
College of Resources and Civil Engineering, Liaoning Institute of Science and Technology, Benxi 117004, China.

Abstract: Under the background of engineering education certification, the traditional personnel training model can't meet the requirements of high-quality personnel training under the new engineering background. Taking Surveying and mapping engineering major of Liaoning Institute of Science and Technology as an example, this paper explores the continuous improvement of the output-oriented talent training model through collaborative education of talents training objectives, curriculum system, practical teaching system, teacher team construction, enterprises and graduates. Over the years, the surveying and mapping engineering major of our school has achieved good results in personnel training. The major actively ADAPTS to the regional development of the local economy, closely connects with the needs of regional talents, and highlights its characteristics in serving the local economy.

Keywords: Results-Oriented Education; Personnel Training; Collaborative Education

Introduction

In January 2021, the Ministry of Education issued the Implementation Plan for the Audit and Evaluation of Undergraduate Education and Teaching in ordinary Colleges and Universities (2021-2025), which clearly proposed to "strengthen the student-centered, output-oriented, continuous improvement" and "achieve high-quality and conformal development". The continuous improvement mechanism should not only include top-down supervision in the management dimension, but also include self-improvement in all aspects of talent training, and also include collaborative education feedback from various aspects such as society, industry, alumni and students.

1. Establish the talent training objectives of surveying and mapping engineering major of our university according to the needs of regional social talents.

Liaoning Institute of Science and Technology is a provincial general undergraduate university with engineering as its main focus and coordinated development of multiple disciplines. Over the years, our school has taken transformation and development as a breakthrough, adhered to the school-running orientation of "application-oriented, local, industry-oriented and international", and based on regional economic and social development and industrial technological progress. The surveying and mapping engineering major of our school originated from the mining surveying secondary school, which was founded in 1952. In the history of running the school for more than 60 years, it has formed a practical teaching system based on the metallurgical industry and cooperation between industry, university and research, and a comprehensive quality training system for innovation and entrepreneurship guided by the construction of surveying and mapping association. The talent training concept of "continuous quality improvement" is based on moral cultivation and training qualified builders and reliable successors for the socialist cause of all-round development of morality, intelligence, physical, American and labor. Senior applied engineering and technical talents who can be engaged in the design, production, research and development and management of surveying and mapping projects in the fields of natural resources, transportation civil engineering, metallurgical and mining construction engineering, surveying and mapping geographic information, etc.

2. Build an output-oriented curriculum system according to talent training objectives.

According to the talent training objectives, the surveying and mapping engineering major of our university has established the talent training concept of "output oriented" and carried out the work in accordance with the working idea of "reverse design and forward implementation"[1] [2]. The reverse design is training goal → graduation requirement → curriculum system; The forward implementation is curriculum system → graduation requirements → training objectives. With OBE (Outcome Based Education) as the teaching concept and student-centered, the curriculum group proposes the innovation and integration curriculum reform based on discipline competition as the carrier, with the purpose of stimulating students' learning interest and initiative and improving students' practical skills. At the same time, the surveying and mapping engineering major of our school actively carries out the 1+X certificate system, starting with the vocational skill level certificate system for the acquisition and processing of surveying and mapping geographic information data, and closely combines the certificate system with course construction and professional construction to improve the quality of vocational education and students' employability.

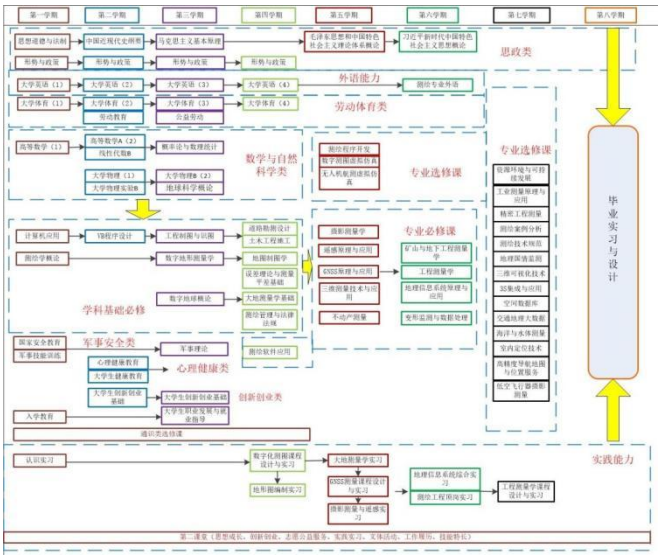

Figure 1. Curriculum system

3. According to the goal of talent training to build a characteristic practice teaching system

The practical teaching of surveying and mapping engineering in our school is based on social needs, improving innovation ability, and establishing a phased, multi-level and all-round practical teaching system. Based on the OBE teaching concept of "education goal + output orientation"[3], the curriculum is student-centered and results-oriented, and constructs a "trinity" teaching goal, namely knowledge, ability and quality. Through the construction of a "three-dimensional classroom" application-oriented teaching activity mode, the classroom teaching results are closely integrated with the cultivation of innovative talents. It embodies the holistic view (serving Liaoning), the integrated view (strengthening the cross-integration of courses) and the craftsman view (curriculum ideology and politics). Construction of "322" practice teaching system (three kinds of practice: professional basic practice, professional comprehensive practice, innovative practice; Two platforms: campus practice teaching platform, off-campus practice platform; Two guarantees: equipment guarantee, teacher guarantee).

4. The construction of teaching staff.

In the process of professional construction, the establishment of high-quality teaching staff is also a key part of professional construction. On the basis of output-oriented, the specialty actively cultivates dual teachers and introduces teachers with practical experience in the industry. Teachers of specialized courses are encouraged to explore the implementation path of curriculum ideology and politics in the process of teaching reform, effectively combine the practical experience they have learned with professional

teaching, continuously improve and innovate teaching methods, and actively expand the coverage of multi-specialty and interdisciplinary subjects[4]. Give full play to the characteristics of engineering colleges, extract patriotic feelings, social responsibility, cultural confidence, humanistic spirit and other elements, and transform them into concrete and vivid effective carriers of core values education, realize the effective integration of knowledge imparts and value guidance, and cultivate students' professional identity, social responsibility, humanistic care awareness and "craftsman spirit".

5. Multi-party evaluation mechanism of collaborative education.

5.1 Curriculum achievement evaluation mechanism

The evaluation of the achievement of the course teaching goal is the teaching link that supports the graduation requirement index point, including the compulsory course of the subject foundation, the compulsory course of the major and the elective course of the major. The evaluation cycle of the achievement of the teaching objectives of the course is 1 year, and the evaluation of the achievement of the teaching objectives of each course is completed after the make-up examination at the beginning of the semester after the teaching term.

The evaluation process of achieving curriculum objectives is as follows:

(1) The achievement degree evaluation of curriculum objectives includes the achievement degree evaluation of curriculum sub-objectives and the achievement degree evaluation of overall curriculum objectives.

The formula for achieving degree is as follows:

Achievement of course sub-objectives=Average scores of all samples supporting the relevant assessment links of the course sub-objectives/Total scores supporting the relevant assessment links of the course sub-objectives (weighted scores).

Degree of achievement of total course objectives=min{degree of achievement of sub-course objectives}.

(2) It is necessary to clarify the corresponding relationship between the curriculum evaluation content and the curriculum objectives, as well as the proportion of the evaluation content in the corresponding curriculum objectives and the reduced score.

(3) Complete the calculation of the score of all students in the class, and take the average score of the students' goal to obtain the weighted average score of each goal of the course, divide the weighted average score by the total score of the corresponding link, and obtain the ratio of the average score to the total score. The lowest value of the ratio of each goal of the course is taken as the achievement degree value of the course goal.

(4) It is necessary to complete the calculation of the achievement degree of each course goal of all students in the class, and draw the distribution map of the achievement degree of each course goal. The formula for calculating the degree of achievement of students' curriculum goals is:Degree of achievement of students' curriculum goals=Assessment score of students' curriculum goals/Total score of assessment links of supporting courses for this goal (weighted score).

Then, according to the data of the degree of achievement of the course goals, the overall situation of the course and the individual situation of students were analyzed to find out the reasons for the low course goals and put forward a continuous improvement plan.

5.2 Feedback from employers and graduates

Through interviews with employers, students, questionnaires of previous graduates, students' examination scores and credits of the second class quality development, it is proved that the evaluation results of courses or practical links can be used as the basis for achieving graduation requirements. The survey results of employers' satisfaction with the school in the past five years show that the surveying and mapping engineering major of our school meets the employment standards of enterprises in terms of talent training objectives, engineering practice ability, professional level, team spirit and interpersonal communication ability. The training objectives of surveying and mapping engineering in our school have been widely recognized by graduates and employers, and the graduates' employment direction is highly matched with the training objectives.

6. Conclusion

The "outcome-oriented" applied talent training mode of surveying and mapping engineering major of our school has been praised in terms of talent training effectiveness and social recognition. The "Engineering Applied Talent Training Mode of Surveying and Mapping Engineering Major based on international engineering education Concept" won the third prize of Liaoning Province Teaching

Achievements in 2022. This model expands the comprehensive ability of professional students from the systematic and professional level, not only highlights the characteristics of surveying and mapping engineering, but also closely connects with the needs of regional talents, highlighting the application type, and is a talent training model worth promoting.

References

[1] Outcome--based education[OB/EL], http://en,wikipedia.org/wiki/Outcome--based -education #United- States.

[2] Li ZY. Analysis of the result-oriented concept of Engineering Education Professional Certification[J]. China Higher Education, 2014(17): 7-10. (in Chinese)

[3] Gu PH, Hu WL, Lin P, Bao NS, Lu XH, Xiong GJ, Chen Y. Engineering education model based on "Learning Output" (OBE): Practice and Exploration of Shantou University [J]. Higher Engineering Education Research,2014(1):27-37.

[4] Cheng Y. Practice and exploration of "output" oriented applied talent training model for musicology teacher major in local colleges and universities -- Taking Lishui University as an example [J]. Journal of Lishui University. 2022,44 (6):104-108.

Fund Project: Liaoning Province Education and Teaching Reform Research Project (Project Number: 202211430807), Liaoning Institute of Science and Technology Undergraduate Teaching Reform Research Project (Project Number: 2022018, 2021018), Liaoning Province first-class curriculum construction (Project Number: 20221143023), Liaoning Institute of Science and Technology education teaching research project (Project Number: LKJY202309).

About author: Xu Ting(1988-),female,master’s degree, lecturer.