

Exploration and practice of multi-construction of new engineering practice base in local ethnic colleges

Yuntao Wang¹, Jishun Lin¹, Wenyu Bao¹, Xueyan Chen¹, Lixin Li²

1. College of Engineering, INNER MONGOLIA MINZU UNIVERSITY, Tongliao 028043, China

2. Zhejiang HanHUAN Education Development Co., LTD. Ningbo, Zhejiang 315600, China

Abstract: At present, the main problem restricting the development of engineering majors in local ethnic colleges and universities is the weak practice teaching link. Under the background of new engineering, with the help of external forces, multiple subjects adopt “four-way linkage”, carry out “three-docking”, promote “three-joint”, and cooperate to build new engineering practice bases are effective methods to improve the quality of practical teaching. Practice has shown that this model greatly improves the quality of training applied engineering talents, and explores a development path of practical teaching that integrates production and education and alternates work with work.

Key words: Local ethnic colleges and universities; Engineering major; Multiple co-construction; New engineering practice base

Due to the constraints of economic development, location and transportation, cultural conditions and other factors, the engineering majors in local colleges for ethnic minorities are relatively weak and lagging behind in the aspects of teaching staff, experimental equipment and educational philosophy, especially the weak practice teaching links. New engineering is a strategic action to take the initiative to cope with the new round of scientific and technological revolution and industrial change, and is a new direction of engineering education reform in the new era. Under the background of new engineering, the only way to improve the quality of practical teaching is to build new engineering practice bases with the help of external forces and multi-subject cooperation. According to the concept of “new engineering”, colleges and universities should focus on the key technologies and core needs of the industrial chain and innovation chain gathered in the region, deeply explore the sustainable development model with the platform set up by the government and the deep participation of universities and enterprises, take the initiative to meet the needs of regional economic and industrial development to promote the construction of new engineering practice bases, and explore the reform of the mixed ownership school system.

1. Analysis of problems existing in engineering professional practice in local colleges for ethnic minorities

The development of engineering practice teaching in local colleges for ethnic minorities mainly faces the following problems.

1.1 There is a big gap in practical teaching equipment

The requirements for experimental equipment for engineering majors have the characteristics of full variety, sufficient quantity and fast renewal. However, the shortage of experimental equipment used by engineering majors in local ethnic colleges and universities is quite serious, and the problems of overdue and obsolete experimental equipment are quite serious, which cannot meet the needs of practical teaching. The rapid development of the manufacturing industry has put forward higher and higher requirements on the innovative ability and practical ability of teachers and students, and the problems existing in the experimental equipment have become the bottleneck for the further development of practical teaching.

1.2 The practice teaching model is not perfect

The practical teaching of engineering major is composed of in-class experiment, course design, course practical training, production practice, graduation practice, etc. However, the practice teaching mode of local colleges for ethnic minorities is not open enough to guide students to think independently and encourage students to actively innovate. There is still a phenomenon that theory teaching is the main and practice teaching is the auxiliary. The reason is that the practical teaching mode has not fully implemented the OBE education concept and can not keep up with the needs of the industry. The cultivation of students' practical ability needs to be guided by the needs of industries and enterprises. However, the lack of real engineering situations, insufficient reserve of experimental cases and project cases, and delayed update of them are not conducive to improving students' engineering practical ability and higher order thinking ability. Most teachers in local ethnic colleges and universities are graduates and employed in colleges and universities, and lack “double-qualified” teachers. In the process of practical teaching, teaching design cannot be carried out according to the actual needs of enterprises. As a result, the practical teaching methods are rigid and the practical teaching content is disconnected from the actual production, which leads to the failure of students to accurately adapt to the needs of enterprises.

2. Adopt the “four-way linkage”, carry out the “three-docking”, promote the “three-joint”, and build a multi-dimensional new engineering practice base exploration and practice

In 2017, the major of Material Forming and Control engineering of Inner Mongolia Minzu University began to explore the multi-construction of new engineering practice bases by adopting the cooperation mode of “Trinity and four-way linkage”. “Trinity” refers to the cooperation between the government, schools and enterprises to build a platform for students to practice and find employment; The “four-way linkage” means that the government, schools, enterprises and third-party professional personnel service agencies build a talent cultivation

system. Guided by the needs of industries, reform the existing practical teaching model, deepen the integration of production and education, and promote the reform of practical teaching by alternating work with work.

2.1 Connotation of multi-component construction of new engineering practice base

On the basis of the existing cooperation, the major further implements the “four-way linkage” model to promote the integration of industry and learning to build new engineering practice bases, and implements the OBE education concept to carry out the “three-docking”, that is, accurately docking the industrial chain, innovation chain and talent chain, guided by the industry’s demand for professional knowledge structure and students’ practical ability. Through the “three joint”, that is, the joint development of training programs, the joint construction of curriculum systems, and the joint training of dual teacher teams, the university and enterprise innovate the training mode of engineering education talents, build a collaborative education mechanism with deep integration of industry and learning, and explore the sustainable development and construction path of new application-oriented undergraduate majors. The construction mode is shown in the following figure.

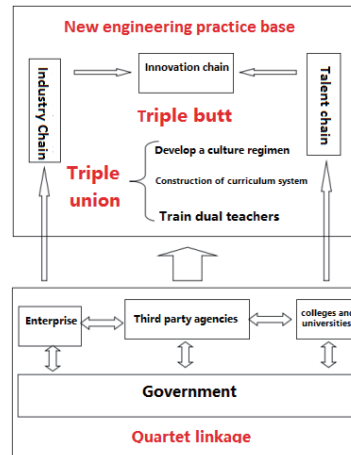


FIG. 1 Construction mode of multi-component new engineering practice base

2.2 Multi-party construction of new engineering practice base

Carry out in-depth construction and management of new engineering practice bases in the "four-way linkage" mode, explore the reform of mixed-ownership school system, study the establishment of a collaborative education mechanism with deep integration of industry and science, and establish a new mechanism for enterprises to deeply participate in the construction of new engineering practice bases and personnel training. Including the establishment of the practice base council (board of directors) and expert steering committee with the participation of schools, governments, enterprises and other parties, and the construction of the management mechanism to exercise the decision-making power of major matters in the practice base. Highlight the industry orientation and application orientation, guided by the industry's demand for professional knowledge structure and students' practical ability, accurately analyze the corresponding relationship between majors and industrial chain and talent chain, clarify the development direction of the new engineering practice base, and provide a basis for the formulation of training programs, the construction of curriculum system and the double-qualified teacher team. Focusing on the industry's demand for key technologies and innovation, strengthen the cultivation of students' practical and innovative ability, carry out task-oriented and project-oriented teaching for the real production environment of enterprises, and study the talent training process guided by improving practical and innovative ability. By analyzing the measures and results of integrating the industrial chain, innovation chain and talent chain, the construction path of professional sustainable development is constructed.

The relevant courses have been adjusted according to the actual situation of production, so that the training plan has better operability. Schools and enterprises have jointly developed teaching projects, teaching materials and implementation cases in combination with their respective advantages, enriched curriculum teaching resources, and built high-quality curriculum content with professional characteristics. According to the cognitive rules and acceptance characteristics of students, personalized practical teaching is promoted, and students are encouraged to participate in the research and development of enterprise projects and carry out practical and innovative activities.

3. The effectiveness of building new engineering practice bases in multiple ways

Through the "three docking", we have established a skill matrix, drawn a practical training map, developed practical training courses, cultivated skill tutors and internal training lecturers, and established a practical training management system and evaluation system, and built more than 20 enterprises into accurate practical training bases that meet the requirements of integration of production and teaching.

In the practice training base, students can not only complete the practical teaching links such as course practical training and course design, but also experience the real engineering environment, understand the characteristics and needs of the industry, and understand the project development process and norms of enterprises under the guidance of enterprise skill tutors. It can also combine the engineering practice requirements of the society for material molding professionals, establish a student-centered teaching method, and cultivate students' lifelong learning ability. In order to make the practical training courses and production practice seamless connection, professional personnel training program from "3+1" to "2.5+1.5", the enterprise undertakes a considerable amount of courses and training links, open up the barriers

between the supply side of talent training and the demand side of industry development, tailor-made for enterprises to create high-end skills talent "production line", to achieve the "use, use" talent training advantages.

According to the needs of enterprises and the wishes of students, the industrial chain, innovation chain and talent chain are accurately connected, and professional application-oriented talents are trained by classification. Through the "three docking", every student with strong employment intention can find a practical training and employment path with reasonable planning and clear direction. Since the cooperation, 347 students have achieved precise employment. Graduates trained by this model have been widely recognized and recruited by enterprises. The average entry salary has increased by more than 60%, the cost of talent cultivation has decreased by 50%, and the retention rate of enterprises has reached 90%, demonstrating the advantages of cooperative education. This application-oriented college student training mode is highly consistent with The State Council's "Several Opinions on Deepening the Integration of Production and Education", and has been successfully selected as a typical case of education integration cooperation between universities and enterprises by the Ministry of Education in 2021. This training model has attracted the attention of the Ministry of Human Resources and Social Security and major mainstream media, and has shown a good momentum of development.

4. Conclusion

Local colleges for ethnic minorities adopt the "four-way linkage", carry out the "three-docking", promote the "three-combination", and build new engineering practice bases for multiple engineering majors are important measures to improve students' practical ability, promote interdisciplinary integration, and serve local economic development. Through school-enterprise cooperation, the construction and management of the practice base are constantly improved, providing a strong guarantee for training high-quality engineering professionals who meet the requirements of new engineering. This model has greatly improved the training quality of applied engineering talents, and explored a practical teaching development path that integrates production and education and alternates work with work.

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About author: Yuntao Wang (1973.5-), male, PhD, Associate professor of Inner Mongolia Minzu University.