Research on the Construction of Teaching Staff of Mechanical and Electrical Major in Local Colleges under the Background of New Engineering

Lu Mingzhu, Wang Bingzhang

[Abstract] Teaching staff construction is an important content of professional construction. New engineering background and engineering education certification standards put forward new requirements for the construction of electromechanical major and talent training in local colleges, and higher requirements for the overall quality of teachers. Taking the construction of teaching staff of three mechanical and electrical undergraduate majors in Cangzhou Normal University as an example, this paper aims to strengthen the construction of teachers’ morality and style and improve the level of moral education; it explores the ways to improve teachers’ professional quality ability by combining on-campus training, off-campus learning and enterprise training and vigorously cultivates “double-qualified” teachers; it also establishes interdisciplinary teaching team and has achieved remarkable results on the construction of teachers’ team.

[Key words] new engineering; local colleges; mechanical and electrical major; construction of teaching staff

[About the Author] Lu Mingzhu (1974—), female, from Luoshan, Henan, China, professor. Research interests: management of engineering education, optoelectronic detection technology and application, computer application technology.

[DOI] https://doi.org/10.62662/kxwxy0107002

[Website] www.oaej.net

1 Introduction

The construction and development of new engineering disciplines should focus on the construction of new engineering specialties and their talent cultivation. In general, local colleges should implement the construction of new engineering disciplines, that is, the construction of new engineering disciplines should focus on the disciplines that are needed by local industries and industries in the present and the future, and take requirements of the localities as the construction standard, so as to construct new engineering disciplines and train new engineering professionals. The quality of training application-oriented talents under the background of “new engineering” depends to a large extent on the overall quality of the teachers. Therefore, it can be seen that high-level teaching staff are the key to the training of application-oriented talents under the background of “new engineering”.

Cangzhou is located in the southeast part of Hebei Province, with Bohai Sea on its east, and Beijing and Tianjin on its north. During the 13th Five-Year Plan period, Cangzhou has adopted a new “5+7+1” manufacturing system in line with the new development trend of “Made in China 2025”. It takes 5 traditional industries as its dominant industries, i.e., petrochemical industry, pipeline equipment and metallurgy, machinery manufacturing, clothing and textiles, and food processing; 7 emerging industries as its focus, i.e., automobile, biomedicine, clean energy, general aviation, energy conservation and environmental protection, laser R&D applications, and remanufacturing; along with other new industries. Cangzhou Normal University is a local undergraduate university in Cangzhou, and its School of Mechanical and Electrical Engineering boasts three electromechanical specialties,
namely, mechanical and electronic engineering, automation, and electrical engineering and automation. The university has been committed to serving the local economic development and cultivating high-quality electromechanical professionals for Cangzhou. Through the survey, the total amount, structure and quality of electromechanical professionals in Cangzhou are far from meeting the needs of the new manufacturing system. Under the background of "new engineering", the cultivation of electromechanical specialists pays more attention to the applicability of technology, practice and the frontiers of theoretical knowledge, which requires teachers to have rich knowledge of basic theories and cutting-edge technological information, as well as rich practical experience in engineering and social service ability.

2 Current status and problem analysis of the teaching staff of electromechanical majors in the college

2.1 Current status

According to the requirements of national standards for teaching quality of undergraduate majors of universities for the teaching staff of mechanical, electrical and automation majors, the requirements of the engineering education accreditation standards (revised in November 2017) for the teaching staff, as well as the requirements of the supplemental standards of engineering education accreditation for the teaching staff of mechanical majors and electronic information and electrical engineering majors (revised in 2020), the current status of the teaching staff of the college's electromechanical majors is as follows: when the undergraduate teaching qualification was under assessment, the majors of electrical engineering and automation, automation, and mechanical and electronic engineering were new majors, and the number of full-time teachers basically met the requirements of the qualification assessment. But now the three majors are not new anymore, according to the current enrollment scale, the number of full-time teachers and professional experimental teachers of electrical engineering and automation and automation is insufficient. According to the national standard for teaching quality of undergraduate majors in universities, some teachers cannot be attributed to the existing three electromechanical majors. The proportion of full-time teachers with master degree, doctoral degree and senior title is low. The proportion of full-time teachers with practical experience in enterprises or related engineering and the proportion of those who have been engaged in engineering design and research are low. There is a lack of influential leaders of disciplines in the region, and the cultivation of "dual-teacher and dual-competence" teachers needs to be further strengthened.

2.2 Problem analysis of the current status

Established in 1966, Cangzhou Agricultural and Mechanical Engineering School is the predecessor of School of Mechanical and Electrical Engineering in Cangzhou Normal University. Its scale has been transferred from secondary professional education, higher vocational and technical education to undergraduate education, and its specialty has shifted from agricultural mechanization, and mechanical design and manufacturing to electrical engineering and automation, automation, and mechanical and electronic engineering. Teachers from the old specialties of Cangzhou Agricultural Mechanical Engineering School account for nearly 1/3, majoring in agricultural mechanization in their undergraduate studies. However, agricultural mechanization belongs to agricultural engineering, and cannot be attributed to the electromechanical specialty.

Since the establishment of the undergraduate program of electrical engineering and automation in 2012, more attention has been paid to the academic structure of the recruited talents. A group of young teachers with master degree in electromechanical specialties have been recruited, and have become the main and important force to undertake teaching and research work. However, they lack the experience of engineering practice, and have a
relatively weak ability in this aspect. For local colleges, they cannot meet the demand for dual-teacher and dual-
competence teachers of electromechanical specialties under the context of new engineering disciplines, which will
affect the quality of teaching and talent cultivation.

High-level talents are the “locomotive” to lead and drive the construction of disciplines and the development
of specialties. Academic research teams need to be led by excellent discipline leaders. There is a lack of high-
level talents in electromechanical specialties of School of Mechanical and Electrical Engineering in Guangzhou
Normal University. High-level talents are in a shortage, and it’s difficult to recruit them and let them produce
excellent results, which in turn affects the construction of disciplines and specialties. Due to the geographical
reasons and platform disadvantage, it is very difficult to recruit doctors in electromechanical majors, and there are
no doctors in present teaching staff.

3 Explore the path of constructing the teaching staff of electromechanical majors in local
universities under the background of new engineering disciplines

3.1 Strengthen the construction of teachers’ morality and enhance the level of moral education

The construction of teachers’ morality is the key project of teaching staff construction. Xi Jinping, General
Secretary of CPC, pointed out that the foundation of colleges lies in moral education. Teachers are the key to the
fundamental task of implementing moral education. Teachers are the foundation of education, and their morality is
the foundation of themselves. Thought on Socialism with Chinese Characteristics for a New Era is the ideological
and action guidance for the construction of college teachers’ morality. Before educating students, they must first
ducate themselves. College teachers should be firm in political direction and patriotism first. The school has
carried out a series of learning activities, allowing all teachers to study Higher Education Law, Teachers Law, Ten
Guidelines for College Teachers’ Professional Behavior in the New Era, 40 New Articles of Higher Education and
the stories of outstanding teachers. The school studied Opinions on Strengthening and Improving Teachers’ Morality
Construction in the New Era issued by Ministry of Education and other seven ministries and commissions, and
formulated the Program for Teachers’ Morality Construction in School of Mechanical and Electrical Engineering,
integrating the construction of teachers’ morality construction into the whole process of education. In-depth
education activities on the theme of “remain true to our original aspiration and keep our mission firmly in mind”
were carried out, and were integrated with the fundamental task of implementing moral education. All teachers are
advocated to become teachers with lofty ideals, integrity, knowledge and a strong sense of discipline, guide
students in four different aspects (character, knowledge, innovative thinking and patriotism), and strive to
enhance the effectiveness of education activities for teachers.

3.2 Explore ways to improve teachers’ professionalism through a combination of on-campus
training, off-campus learning and enterprise training, and strengthen the cultivation of “dual-
teacher, dual-capability” teachers

For on-campus training for electromechanical teaching staff, 5 main measures were taken; (1) implementation of pre-service training system for young teachers. Organize training camps to improve the quality of
young teachers in all aspects, including moral development, basic teaching skills, educational theory, etc.; (2)
select online training courses related to the specialty by teachers from national universities, carry out the online
course training among teachers, and let them learn the lecturing methods and art of teaching; (3) implement the
mentor system for young teachers to systematically ensure the guidance and training of young teachers. Young
teachers can be equipped with instructors, who can offer targeted guidance to them in preparation, lectures and
scientific research, and help them to stand firm and take on important responsibilities as soon as possible; (4) through lecture competition, academic lectures and other activities, the growth of teachers can be promoted as soon as possible; (5) construction of iconic professional laboratories, such as; Mitsubishi Motors laboratory. By using the advanced equipment in the laboratory, and inviting technicians from Mitsubishi Motors Automation (China) to deliver a technological training to teachers, training program can be formulated, training content can be designed, and assessment methods can be clarified, thus ensure the effectiveness of training, and the improvement of teachers’ capabilities of professional application and the dual–teacher quality.

There are three main forms of off–campus learning; (1) Off–campus learning to upgrade the academic level of teaching staff. Young and middle–aged teachers are encouraged to acquire master’s and doctoral degrees. For young and middle–aged teachers whose undergraduate majors are agricultural mechanization, they are encouraged to acquire master’s degree, and for those with master’s degree to acquire doctoral degree. Over the past four years, one teacher has obtained a master’s degree, three teachers have been enrolled in master program, and one teacher has been enrolled in a doctoral program, laying a good foundation for optimizing the academic structure of teaching staff. (2) Select key teachers and young teachers to key universities in China and teacher training base of Ministry of Education for further study, and let them participate in teaching seminars on engineering ability training, professional construction, curriculum construction, teaching reform and industry–teaching integration, so as to improve their quality, which strongly ensures that teaching and scientific research activities are carried out. (3) Invite famous professors from Institute of Automation of Chinese Academy of Sciences, Tianjin University, Beijing Normal University, Nanjing Engineering University, Tianjin University of Science and Technology, etc., and senior engineers from Mitsubishi Electric (China) Ltd. to give lectures in the college. The professors and experts have put forward new ideas and practices in the development of new engineering disciplines, new models for talent training and industry–teaching integration, imparted valuable experience that can be drawn on, deepened the level of academic exchanges, broadened the horizons of teachers, and guided young teachers to further set up an application–based, learning for use teaching concept. Teachers have clarified their thinking, and their education and teaching concepts have undergone a fundamental change, thus significantly improve their teaching level.

Constructing teachers’ workstations in Cangzhou High–tech Industrial Development Zone and Cangzhou Canal Laser Industrial Park enables them to enter the enterprise for engineering practice ability exercise. They can participate in technological innovation, project research and development and other practical activities, know about manufacturing industry’s new technology and process, accumulate practical experience in engineering, and improve their scientific research ability. It strengthens the capacity training of industry–university–research integration, enhance teachers’ “engineer quality” and ability to guide the practice of teaching, so that the teaching staff can take a big step forward from “theoretical” to “dual–teacher”. It has significantly promoted the method and reform of practical teaching, provided powerful support for updating the content of classroom teaching and graduation design topics, and played an active role in promoting industry–university–research cooperation in education.

3.3 Formation of interdisciplinary teaching team

As an important part of the construction of new engineering disciplines, interdisciplinary education has received wide attention. Wu Aihua et al. pointed out that the construction of “new engineering” should explore the multidisciplinary cross–incorporate mode of talent cultivation, including the establishment of interdisciplinary courses, interdisciplinary teaching teams, interdisciplinary project platforms, and the promotion of interdisciplinary
cooperative learning. In view of the characteristics of local industries in Cangzhou, focusing on the requirements of the construction of new engineering disciplines, the local characteristics and the construction of electromechanical professional teaching team are strengthened, and the interdisciplinary teaching team is constructed. For example, teachers of mechanical engineering, control engineering, electrical engineering and ideological and political education form the teaching team of industrial robotics, with teachers of mechanical engineering teaching robot structure and dynamics, teachers of control engineering teaching machine vision and control technology, teachers of electrical engineering teaching electrical machinery and electrical control, and teachers of ideological and political education giving overall guidance to the course of ideological and political content.

4 Conclusion

By exploring the path of teaching staff construction of electromechanical majors in local universities under the background of new engineering disciplines, in recent years, among teachers from School of Mechanical and Electrical Engineering, one young teacher has been enrolled in the doctoral program, four young and middle-aged teachers have obtained the master’s degree, two young and middle-aged teachers have been promoted to professors, and three young teachers have been promoted to associate professor, with young teachers playing the role of reserve. At present, the college owns a teaching team with excellent teaching and morality, which can meet the needs of undergraduate teaching, demonstrating the effectiveness of teaching staff construction.

References:


