

Enlightenment of Germany's "Dual System" Applied Postgraduate Training Mode to China's Engineering Postgraduate Training Mode

Lei Fan

School of Civil Engineering and Architecture, Zhejiang University of Science & Technology, Hangzhou, China
Corresponding author's (Lei Fan)

Abstract: Based on the training standard of engineering master in China, this paper discusses the training mode of German "dual system" applied graduate students and its enlightenment to China. Germany's "dual system" training mode emphasizes the close combination of theory and practice, and pays attention to the joint training between schools and enterprises, which can effectively improve the engineering quality and practical operation ability of graduate students. On the basis of this model, this paper puts forward some reform suggestions on the enrollment, curriculum, school-enterprise cooperation and other aspects of graduate education of engineering majors in China, so as to meet the needs of national economic construction and scientific and technological innovation and development.

Keywords: Dual system applied graduate students; Engineering major; Reform of training mode; School-enterprise cooperation; civil engineering

Date of Submission: 09-11-2024

Date of acceptance: 21-11-2024

I. INTRODUCTION

As an important part of engineering specialty in China, civil engineering directly serves the national infrastructure construction and economic development. With the transformation of China's economy from resource-driven to innovation-driven, the training of engineering postgraduates is facing new challenges and opportunities. Germany's "dual system" applied postgraduate training model, with its rigorous school-enterprise cooperation and practical orientation, provides an important reference for China's current engineering postgraduate education reform. The purpose of this paper is to explore how to learn from Germany's "dual system" model and provide direction for optimizing the training mode of engineering postgraduates in China [1].

1.1 Germany's "Dual System" Applied Postgraduate Training Mode

The "dual system" education model originated in Germany, which aims to closely combine theoretical study with practical work, especially in the cultivation of applied graduate students. The dual system cultivates high-quality talents with professional knowledge, practical ability and innovative spirit through school-enterprise cooperation [2].

Germany's "dual system" postgraduate training is divided into two forms:

Joint training: The school cooperates with enterprises or scientific research institutions. The research topics of graduate students are usually related to practical work, and students conduct academic research while practicing in enterprises.

On-campus training: It is similar to traditional full-time education, but emphasizes the combination with practical engineering projects. Students keep close contact with the industry by participating in scientific research projects on campus.

1.2 Career orientation and curriculum

Germany's "dual system" applied master's course covers professional core courses and industry-related extension courses, focusing on cultivating students' practical ability and professionalism. Students have determined their future career direction from the beginning of enrollment, and the curriculum is closely connected with the needs of enterprises to ensure that students can quickly adapt to their jobs after graduation [3].

2. The present situation and challenges of postgraduate training of engineering majors in China

The training mode of engineering graduate students in China is still based on theory, and the practice link is relatively weak, which leads to the disconnection from the needs of enterprises. With the rapid development of China's economy, the training of engineering postgraduates faces many challenges:

Insufficient practical ability: In the current training mode, theoretical learning is dominant, and students' practical operation ability is relatively weak, which is difficult to meet the needs of engineering practice.

School-enterprise cooperation is not deep enough: Although some colleges and universities have established cooperation mechanisms with enterprises, most graduate students have less opportunities to contact enterprises and lack real practical experience.

The curriculum is relatively backward: The curriculum system is relatively traditional and fails to fully integrate with the latest technological development and industry needs, especially in the rapidly developing fields such as civil engineering, and the curriculum content needs to be updated urgently [4].

3. Enlightenment of Germany's "Dual System" Model for China

3.1 Strengthen school-enterprise cooperation and promote joint training

China's colleges and universities can learn from Germany's "dual system" joint training model, strengthen cooperation with enterprises, and establish a joint training mechanism between schools and enterprises. Through the joint development of postgraduate training programs by enterprises and schools, students can not only study in the campus, but also go deep into enterprises and participate in the engineering practice of actual projects. This can not only improve students' practical ability, but also help them better adapt to the future working environment [5].

3.2 Optimize the curriculum and pay attention to engineering practice

Colleges and universities should optimize the curriculum system according to the needs of the industry and increase the proportion of courses related to practical engineering applications. For example, in the field of civil engineering, digital courses such as intelligent infrastructure and building information model (BIM) can be added to cultivate students' interdisciplinary ability. At the same time, the curriculum should be more flexible to adapt to the rapid development and changes of engineering technology.

3.3 Strengthen career orientation and define training objectives

The training of engineering graduate students should pay more attention to career orientation, help students to define their career development path from the beginning of enrollment, and provide career planning and internship opportunities during the learning process. Through cooperation with enterprises, we can understand the needs of the industry and make a study plan that meets students' personal development goals, so as to ensure that they have the ability to enter the workplace when they graduate [6].

3.4 Improve the funding system to reduce the financial burden of students

German "dual system" graduate students can get certain economic returns during their enterprise practice and reduce the economic pressure during their studies. China should learn from this model, encourage enterprises to provide financial support for graduate students who participate in joint training, get paid through internships or project participation, reduce the economic burden of students, and attract more people with lofty ideals to study in engineering majors [7].

4. Promote interdisciplinary integration and enhance innovation ability.

The future development of engineering disciplines not only depends on technical ability, but also needs deep integration with other disciplines. Traditional disciplines such as civil engineering need to be combined with computer, communication, management and other fields to solve complex problems in modern engineering [8]. The combination of information technology and civil engineering can promote the development of smart cities, intelligent transportation and other emerging fields. In the process of training, colleges and universities should pay attention to interdisciplinary study and research to improve students' innovative ability and comprehensive

quality.

II. Conclusion

Germany's "dual system" applied postgraduate training model provides valuable experience for China's engineering postgraduate education. By strengthening school-enterprise cooperation, optimizing curriculum system, focusing on career orientation and promoting interdisciplinary integration, China can effectively improve the training quality of engineering postgraduates and cultivate high-quality professionals with innovative spirit and practical ability. This will provide strong support for the sustainable development of China's engineering technology field and will also help the implementation of the national innovation-driven strategy.

Disclosure statement

No potential conflict of interest was reported by the authors.

Acknowledgments

This work was supported by a Country and regional research project of German-speaking countries in Zhejiang University of Science and Technology (Project number: 2022DEGB004)

References

- [1] Lackner. On cooperative higher education as a supreme and innovative mechanism of applied higher education. *Application-Oriented Higher Education Research*, 2022, 7: 34-38.
- [2] L.Q. Xu, H.H. Zhang, Z.Y. Wang. The dual system of higher education in germany: The characteristics and enlightenment. *Journal of Higher Education*, 2022, 43: 101-109.
- [3] Q.H. Shi and Z.W. Chen. Dual-orientation in the post-graduate program in German universities of applied sciences. *Journal of National Academy of Education administration*, 2016, 4: 1-11.
- [4] R. Xi and H.M. Shen. Dual system in Germany and the cultivation of high-level applied technical talents. *World education information*, 2015, 24: 12-16.
- [5] Z.B. Hua. Enlightenment of Germany's "Dual System" on China's professional degree postgraduate education reform. *theoretical research*, 2017, 12: 15-17.
- [6] Zhang and G.L. Chen. Enlightenment of German university of applied sciences on the transformation and development of local universities in China. *Journal of National Academy of Education administration*, 2015, 1: 87-90.
- [7] X.F. Chen, H. Zhou, X.M. Xu, T.T. Xu. Inspiration of Germany's applied postgraduate training mode to China's engineering master training. *Quality education in western China*, 2018, 7: 1-3.
- [8] H. Lackner. On the doctoral degree awarding right of German university of applied sciences. *Application-Oriented Higher Education Research*, 2023, 8: 83-90.