

Exploration and Application of Talent Training Mode of Traffic Engineering Speciality for "New Engineering" Construction

Maoping Ran^a, Xinglin Zhou^{b,*}, Yaqin He^c, Yunbing Yan, Li HU

School of Automobile and Traffic Engineering, Wuhan University of Science and Technology, Wuhan, Hubei, China

^ampran@163.com, ^bzx165@163.com, ^cheyaqin@126.com

*corresponding author

Keywords: new engineering, traffic engineering, talents training, strategy

Abstract: China's economic development is facing the heavy task of Kinetic energy Conversion, mode transformation and structural adjustment. New technologies, new products, new formats and new models are booming. Engineering education and industrial development are closely linked and mutually supported. Engineering education provides talent support to the development of new industries. The future emerging industries and new economy need high-quality compound "new engineering" talents with strong engineering practice ability and international competitiveness. Under the background of "new engineering", combined with the reform of Traffic engineering speciality, this paper explores the talent training strategy of Traffic engineering speciality.

1. Introduction

Under the implementation of the major strategies such as innovation driven development, "Made in China 2025" and "Internet plus", China has put forward the construction goal of "new engineering", and has formed "Fudan consensus", "Tianda action" and "Beijing Guidelines" successively. In Fudan consensus on "new engineering construction" reached in February 2017, the meaning of "new engineering" is elaborated. One is to actively set up and develop a number of new engineering majors, and the other is to promote the reform and innovation of existing engineering majors. Compared with the traditional engineering, "new engineering" emphasizes the practicality and comprehensiveness of the discipline, takes moral education as the guidelines, takes coping with changes and shaping the future as the construction concept, and takes inheritance and innovation, intersection and integration, coordination and sharing as the main ways to cultivate diversified innovative talents that can meet the needs of new economic development. Therefore, the connotation of new engineering emphasizes "advanced technology", "interdisciplinary integration", "diversity of knowledge system", "innovation of talent training" and so on.

2. The Necessity of Talent Training Reform of Traffic Engineering under the Background of "New Engineering"

Based on mathematics, mechanics, system science, engineering technology and computer science, Traffic engineering is a comprehensive discipline involving engineering, management, science and other disciplines, including transportation planning and operation, traffic information engineering and control, design, construction and maintenance of traffic infrastructure, etc. The graduates can be engaged in traffic planning, traffic engineering design, traffic control and management in traffic planning and traffic management departments, as well as road survey, design, construction and management in highway engineering departments. Due to the complexity of the problems, students are required to have a wide range of knowledge and clear ideas, which is a great challenge to their ability to deal with and analyze problems flexibly. Therefore, the Traffic engineering speciality should seize the opportunity, keep pace with the times, and carry out the reform of "new engineering" construction. In this paper, taking Traffic engineering major of Wuhan

university of science and technology as an example, the reform and application of talent training mode of traffic engineering speciality under the background of new engineering are discussed.

3. Exploration and Application on Training Mode of Traffic Engineering Talents for “New Engineering” Construction

3.1. Set up a New Speciality Training Concept

The traditional traffic engineering speciality of Wuhan University of Science and Technology cultivates talents who master relevant knowledge and can be engaged in traffic planning and traffic control management. Under the background of new engineering, new training concept of Traffic engineering speciality should be determined with the requirements of the new economy characterized by "new technology, new industry, new format and new mode" and the industry. Wuhan University of Science and Technology is located in the central region of China, Under the strategic policy of "China's strength in transportation", transportation infrastructure construction develops rapidly, so there is a great demand for engineering talents. Based on the analysis of the employment direction of the undergraduates, most of them work in engineering units such as China Construction Third Engineering Bureau and China Railway 11 Engineering Bureau. Therefore, the renewal training concept is: serving the Yangtze River economic belt around Hubei Province, traffic planning management and traffic infrastructure engineering (mainly refer to Road and Bridge Engineering) should be strengthened based on traditional training goal, high-quality application-oriented talents competent for the new industry could be cultivated. The undergraduates not only are acquired with the basic core knowledge of traffic planning and management, but also have the ability of design and construction of Road and Bridge engineering. With solid professional foundation, strong application abilities, the undergraduates will have a wide area of employment. In the past three years, the employment rate of Traffic engineering major in Wuhan University of Science and Technology is higher than 95%.

3.2. According to the Industry Standards, in Response to the National Engineering Education Accreditation, the Curriculum System of "New Engineering" Talent Training for Traffic Engineering Specialty is Designed and Constructed

According to the training objectives under the background of "new engineering", combining with engineering education accreditation, the curriculum system is optimized. The Traffic Information and Control engineering module of the original training scheme was canceled, Road and Bridge engineering is instead of Traditional Road engineering module, the professional courses of traffic infrastructure engineering (road and bridge) are strengthened, and the curriculum system of "traffic planning management plus traffic infrastructure engineering" is established (as shown in Figure 1).

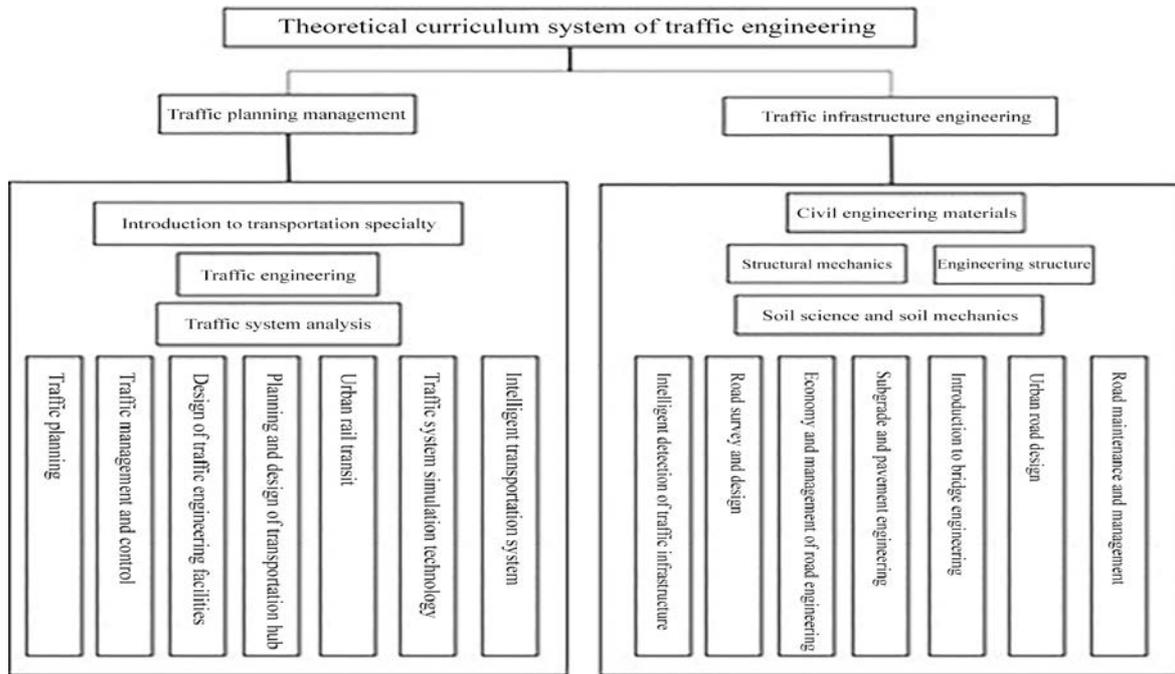


Figure 1 New curriculum system of "transportation planning management + transportation infrastructure engineering application"

At the same time, the practice teaching curriculum should be strengthened too. According to the practice teaching concept of "integration, enhancement and update" and the through-type training requirements of "foundation-improvement-innovation", a new step-by-step practice teaching system is established, as shown in Figure 2.

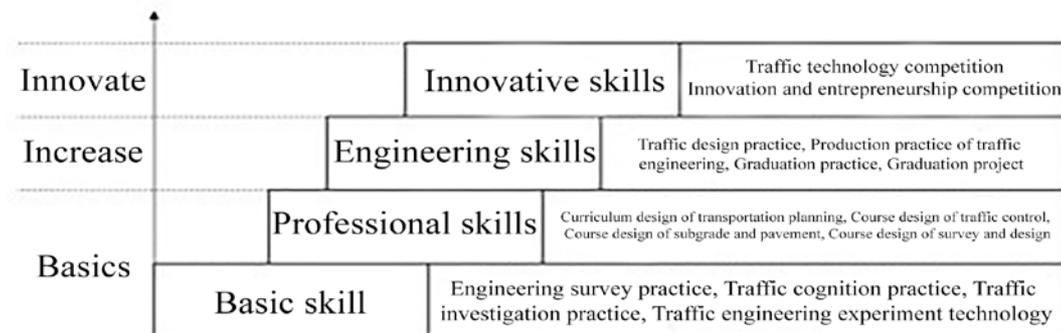


Figure 2 New system of step practice teaching

3.3. To Strengthen Professional Integration, Traffic Engineering Plus Engineering Management Double-degree Talent Training Mode is Put Forward

Traffic engineering is closely related to engineering construction. Economy can not be separated from engineering construction. As skilled technicians in Traffic engineering, they should have some economic knowledge. In order to meet the needs of national economic construction and social development for interdisciplinary professionals, we should cultivate compound Traffic engineering talents with practical ability. Under the background of new engineering, Traffic engineering major of Wuhan university of Science and Technology deepens sepciality reform, in 2018, it tried to break the barriers of different majors and promoted multidisciplinary integration. Aiming at practical and application ability, the double-degree talent training mode of Traffic engineering plus Engineering management is put forward. It is expected to cultivate compound traffic engineering talents who also have economic knowledge and project management knowledge.

3.4. Innovating Teaching Mode with the Concept of Wisdom Education and Internet Plus

Teaching mode and method are important to talent training goal achievements. "New engineering" not only emphasizes the leadership of cutting-edge technologies, but also requires

student-oriented, emphasize teaching process, and teaching interaction and feedback. Making full use of new information technologies such as big data, cloud computing, artificial intelligence and "Internet plus education", intelligent education mode characterized by interactive perception should be established to improve teaching efficiency and students' independent learning ability. In this way, the goal of "student-centered, result-oriented and continuous improvement" under new engineering can be achieved.

To achieve the above teaching goals, five courses respectively referring to Traffic System Analysis, Road Traffic Safety, Traffic System Simulation Practice and Traffic Control and Management adopt online and offline mixed teaching mode. The teaching mode of "online independence learning plus offline teacher-student interaction" deepens the integration of information technology and classroom teaching, thus the students' independence learning ability and self-management ability are both cultivated; "Yu classroom" is introduced into the bilingual course Traffic Engineering, using mobile phones, the students can learn all the resources sent by teachers at anytime and anywhere, moreover, all the students can join in the discussion as an individual by sending their opinion through the internet, which can be of great help to those students who are too shame to share their opinions in live classroom, which promotes the communication and interaction between teachers and students. According to the subject's characterization, some other courses break the traditional teaching methods and adopt some more flexible teaching mode such as Case teaching mode and discussion teaching methods. For example, Traffic Engineering Progress introduces the frontier research content and technology of Traffic engineering by delivering academic report. Breaking the traditional teacher-oriented teaching mode, aiming at student-oriented teaching mode, Road Engineering Economics and Management adopts Case teaching mode and discussion teaching methods, which cultivates the students' ability to analysis and solve problems as well as the sense of teamwork. In teaching assessment, process assessment is paid much attention, take Traffic Engineering as an example, peacetime grade composed of attendance, homework and discussion, is 40% of the final marks, the final exam is 60% of the final marks. Finally, by tracking and analyzing the students' learning effect with the advanced teaching mode and tools, teaching form and management mode can be adjusted on time, the goal of "continuous improvement" in engineering education under the background of "new engineering" is achieved.

Facing the needs, school-enterprise cooperative teaching mode should be carried out to broaden the course. On the one hand, school teachers and enterprise engineers can give lesson together. In course of Introduction to Bridge Engineering, the teachers are mainly responsible for theoretical knowledge, as enterprise tutors, engineers from Hubei Transport Planning and Design Institute Group Co.Ltd are responsible for engineering practice knowledge of bridge design and construction. On the other hand, long-term cooperative relationships between school and enterprise is also established in the form of practice base, Wuhan Linghe Engineering Design Consulting Co., Ltd, and Hubei Zhongguang Design Institute, etc. are cooperated with our school, allowing students to learning in these enterprise, giving opportunity of paid internship. School-enterprise cooperation not only broadens textbook knowledge, but also cultivates the students' engineering practice ability and enhances their employability.

3.5. To Cultivate Skilled Technicians in Traffic Engineering with Both Ability and Political Integrity by Integrating "Ideological and Political Education" to Professional Education

Under the background of new engineering construction, facing the future and based on the needs of new business forms, new engineering talents' ability framework should be established from three dimensions: individual ability, team capability and global consciousness. Team capability and global consciousness are closely related to a person's ideological and political literacy. Therefore, in the process of personnel training, moral education should be put in the first and runs through all aspects of teaching and education. In the process of personnel training of traffic engineering specialty, the ideological and political education is put in the first place. There is no obvious changes in the curriculum, including Ideological and moral cultivation and legal basis, Outline of

modern Chinese history, Military course, Basic principles of Marxism and other courses. However, ideological and political education is integrated with professional knowledge. Traffic system analysis is a basic professional course of Traffic engineering major. In teaching process of this course, except for the general teaching objectives, the teacher also establishes a ideological and political education goal, videos, stories and other ideological and political materials are introduced into the classroom to motivate both enthusiasm for study and patriotism.

4. Conclusion

Under the strategy of "China's strength in transportation", to training application-oriented and technical skilled talents with strong traffic engineering background knowledge to competent for industry development needs, traffic engineering specialty should take "new engineering" construction as the opportunity, take industry demand as guidelines, concise specialty characteristics and continuously carry out and deepen reform.

Acknowledgements

The authors would like to acknowledge the financial support from Provincial Teaching and research projects in Hubei Province(2017248); Teaching and research project of Wuhan University of science and technology (2019X093, 2020X054, 2019Z008, 2020Z004).

References

- [1] Feng Tian-jun, Liang Chun-yan, Zhang Yun-long. Research on Innovations talent education Model of Traffic Engineering under new engineering. *Journal of Higher Education*, no.24, pp.40-42+45, 2019.
- [2] Ye Min, Kong Hanbing, Zhang Wei et al. Emerging Engineering Education: From Idea to Action. *Research in Higher Education of Engineering*, no.1, pp.24-31, 2018.
- [3] ZHOU Kaifa, ZENG Yuzhen. Exploration on the Core Competence and Teaching Mode of New Engineering Education. *ChongQing Higher Education Research*, vol.5, no.3, pp.22-35, 2017.
- [4] Li Zhihong, Zou Fumin. Effective ways to constructing "new (macro-)-engineering discipline" in local undergraduate universities: Taking Traffic and Transportation Engineering Discipline in Fujian University of Technology as an example. *Journal of Fujian University of Technology*, vol.15, no.5, pp.486-490, 2017.
- [5] YAO Jiao, DAI Yaxuan, HAN Yin et al. Research on the Talent-education Mode of Major of Traffic Engineering under the Background of Emerging. *Engineering Education*, vol.42, no.10, pp.159-163, 2019.
- [6] HAN Zhen-feng, Hu Xiao-jun. Constructing Traffic Engineering Application-oriented Talent Cultivation System under the Context of "New Engineering". *Application-Oriented High Education Research*, vol.2, no.4, pp.49-53, 2017.