Study on the Optimization of Rail Transit Curriculum System Based on the Employment Ability

Li-yan QIN*, Jing SHENG and Guo-fei YU
School of Mechanical and Automotive Engineering, Ximen University of Technology, Fujian Province, China
*Corresponding author

Keywords: Rail transit, Curriculum system, Employment ability, Optimization.

Abstract. With the rapid development of urban rail transit construction, the demand for talents in rail transit engineering is increasing more and more. Firstly, this paper analyzed the status of personnel training of rail transportation, and the reasons for the low rate of professional employment. Then training objectives were established to improve the professional ability. This paper analyzed the problems existing in the course teaching and practice teaching in Xiamen University of Technology. In order to provide theoretical reference and method for teaching reform of rail transit management and solve the problems and challenges in teaching and practice, the paper provide several improving methods.

Introduction
With the rapid development of the national economy, traffic congestion in large and medium-sized cities become more and more serious in China. Rail transit is the first choice for urban public transport. Rail transit not only plays an important role in improving urban traffic congestion, but also protects environment. However, the construction of urban rail transit in China started late, due to the economic reasons. Since twenty-first Century, urban rail transit has developed rapidly. By the end of 2015, total of 14 cities had new urban rail transit, which included 24 new lines, amount to new 428.39 kilometers, and 36 urban rail transit projects were approved by [1]. As a technology intensive industry, the rapid development will lead to the great demand for high quality personnel. But the demand for rail transit talents was of low rate in Xiamen University of Technology. The employment rate of rail transportation was only 70.4%, which was far below 89% of the others engineering major, in 2016. The main reason is that the talents trained by schools do not meet the needs of employers. As a result, it is difficult for rail transit graduates to find suitable jobs.

The lack of employability is the most profound internal contradiction between the demand and supply. The crux is to improve the students’ employability. Therefore, the teaching mode reform aiming at improving the professional employability should be carried out, curriculum system be optimized [2, 3].

The Training Goal of Rail Transportation Professional Talents Based on the Improvement of Employment Ability

The First Reason for the Low Employment Rate
(1) The selection of working regions. Many students showed a strong trend of regional choice, and they were likely to choose the work near their hometown or their universities. But the developing and developed urban railway often exists in large or medium-sized city in general. There was no urban railway in most of the cities. So the work region was the low employment rate of urban rail transportation professional graduates [4].

(2) More and more students enrolled in graduate students, civil servants and institutions. Because civil servants or institutions work was fixed, and the income was relatively stable. However, the
civil service institutions and postgraduate places are limited. If the students failed, then they would miss the golden recruitment period.

(3) The third reason was increasing of the number of students studying abroad. Now, the education relationship among the universities of different countries is more closely. Such as, Xiamen University of Technology carried out cooperation and student exchanges with 54 universities, including University of Newcastle, University of Missouri, University of Texas-Austin, University of Victoria (New Zealand), University of Regina (Canada), etc. In addition, there are plenty of people who, hope their children would have a better future and a broader development, then send them go abroad to accept foreign advanced education. But many university graduates failed to apply the university.

The Training Goal of Urban Rail Traffic Professionals

The training applied talents’ goal is to improve the employment ability and to serve the demand of local economic and social development. In order to meet the needs of urban rail transit engineering talents in different regions and posts, colleges and universities as the key link of talent output, must optimize curriculum system to improve students' professional ability, personal ability and employment competitiveness. Through four years of training and education in the university, the students would have theoretical basis, broader professional basic skills and the strong ability of lifelong learning, which make sure the students have access to basic work and working ability.

Construction of the Framework of Urban Rail Transit Project System for Improving the Employability

Problems in the Course of Undergraduate Teaching of Urban Rail Transit Engineering

A questionnaire survey was conducted to survey the students majoring in urban rail transit engineering of Xiamen University of Technology School of mechanical and automotive engineering. And a total of 268 valid questionnaires were collected. Through the results analysis, the problems in undergraduate teaching stage mainly focused on the following three aspects: ① 84.09% responded that the curriculum system was some unreasonable. There was a problem between the foundational courses and professional courses convergence problems. For example, practice of train dispatching was in the second school year, but professional courses were in the third or fourth school year. ② Teaching method was simple. A traditional teaching method was the teacher occupied the whole class. 78.6% of the respondents expressed that teaching practice was not enough; curriculum practice was in low proportion. Moreover, the training schedule should be increased. The cooperation with the enterprises should be increased, then students have more chances to practice in the rail corporation, such as Xiamen rail transit Co., Ltd.. ③ The 58.19% of students regarded that the actual effect was poor including College Students' career planning, Employment guidance and career planning courses. And no personalized counseling according to the characteristics of students was conducted, thus fundamentally needs were unable to meet.

The Course System of Urban Rail Transit Engineering

Combining the above problems, to improve the employment ability, the urban rail traffic engineering course system optimization framework is built, which included: public foundation courses, professional foundation courses, professional courses, practice and training courses and restricted elective courses. The course arrangement takes a step-by-step approach. In the first school year, public foundation courses and professional foundation courses occupy mainly, and the theoretical foundation is rammed; in the second year, professional foundation courses are mainly, focusing on the training of students' professional ability. In the third year, students' comprehensive ability of using the knowledge are enhanced by professional courses, experiment and training courses, and professional elective courses; The students' job hunting ability is uninterrupted cultivated from the beginning of the third school year and the fourth year.
(1) Public foundation courses. Public foundation courses refer to the compulsory courses required by the Ministry of education, including advanced mathematics, college English, ideological and political theory courses, computer basic courses, college physics, sports and so on [5]. At the same time, the optional courses about nature science, humanities and social sciences, are set up. The credits for interdisciplinary elective courses must be at least 8 point. Through learning, students can build up the knowledge, ability and quality structure that can adapt to the needs of lifelong education and social development. The opening of elective courses should greatly reflect the characteristics of professional frontier and practicality.

In terms of teaching methods, teacher lecture should strengthen the social practice activities of political ideological and theoretical courses, helped students to improve their personal ideological accomplishment, to improve observing, analyzing and solving problems in the process of participating in social practice, so as to deepen classroom teaching effect. The practice teaching of ideological and political theory course should organize as much as possible with social practice arranged by the league organization. Student participated in the social public welfare activities, the social investigation, social activities and community service obligation activities, so as to achieve the purpose of training students to enhance the anti-frustration ability, interpersonal communication ability and cultivate the spirit of hard work, enhance the sense of responsibility.

(2) Subject foundation courses. Subject foundation courses are the courses for students who majored in urban rail transit engineering have to study basic theories, basic knowledge and basic skills. The curriculum must be set up in the major disciplines, reflected the requirement of wide caliber and thick foundation. Such as mechanical design basis, mechanical drawing, engineering mechanics, electronic engineering, operational research, management science, management information system and other courses. The above courses are the basic theory of engineering, which were the further study of professional courses.

(3) Professional courses. Professional courses include compulsory courses for the compulsory course of rail transportation major.

Professional compulsory courses are the compulsory theoretical courses for students, which help students to master basic theoretical and rail transit knowledge, to carry out theoretical analysis and technology application in deeper expertise field. Different schools have different emphasis on undergraduate majors, but most of them set up courses according to the links of transportation, combined with the frontier theories of disciplines and practice. For example, urban rail transit of Xiamen University of Technology has set up introduction of rail transit, rail transit engineering and management, rail transit engineering, rail vehicle technology and maintenance, rail transit operation and management, rail transit passenger transport and Limited optional courses provide students to have a choice based on their own interest after students finish foundational courses. Then students can get further professional improvement through learning a series of courses in a particular field of interest. Urban rail transit engineering can be set up the courses involved in railway, highway and urban transportation, so as to expand the professional ability of college students and broaden their horizons. For example, the courses such as traffic engineering, transportation engineering, transportation economy and intelligent transportation system are offered, which embodies that teaching students in accordance with their aptitude, diverting and cultivating.

(4) Comprehensive experiment and training courses. Such courses are mainly designed to enhance students' professional knowledge application ability, problem-solving ability, to improve students' understanding of basic engineering skills and traffic operation management, which mainly include simulation training of driving and dispatching, medical emergency simulation training, locomotive electrical and electronic technology training, track operation practice, track engineering practice training, general management ability certificate training and so on.

The courses including simulation practice of driving and scheduling and medical emergency simulation operation and other courses, break through the traditional way of classroom instruction, and cultivate students' learning ability, professional skills and innovation ability through case teaching, simulation training and so on. In the course of case teaching and simulation, the students should be guided to attach importance to team cooperation, complete the summary of the case and
realize the work goal. Through these methods, the students' team spirit can be trained, the enthusiasm, initiative and creativity are stimulated, and the coordination ability of the organization can be enhanced.

The training courses enable students to practice and understand the process and problems of traffic operation management, to improve the operation process by multiple rounds of simulation, and to improve the management efficiency through simulating the sudden situation, which include track operation practice, track engineering practice training, general management ability certificate training. This learning method has a good effect on helping students understand rail transit operation knowledge, training and improving problem-solving ability and enhancing team spirit.

Actively explore new modes with cooperation, cooperation with metro and rail transportation group and other enterprises to establish the practice base. Then teaching and research programs can be carried out, which can complete the teaching task and improve students' practical ability.

(5) The course of career development. The purpose of occupation development planning education is to establish students' views on profession and occupation, to cultivate students' career development consciousness, to promote college students reasonably and properly planning their future development, so as to improve the employability and career management ability. Career development courses mainly include professional introduction and career planning, professional quality training, career and development planning, entrepreneurial guidance, job simulation course and so on.

Career planning is to help the freshmen to choose their own development direction according to their advantages and disadvantages, to respect the individuality of them, to play the maximum initiative, to guide the students occupation career planning and development consciousness. The career and development plan mainly takes social investigation and social investigation as the main form, help sophomore to further consolidate professional theoretical knowledge, to improve the ability to solve practical problems, and to realize the organic combination of theory and practice. The courses involving occupation literacy training, job simulation and career guidance curriculum will be carried out among senior and junior students, which would follow the actual situation. According to the guiding principles of classification, the activities will tight combined with professional learning, employment and innovation to meet the students' employment ability needs [6].

Conclusions

A training system aimed at improving students' employability is put forward, considering the current development of rail transit industry and the actual employment situation of the students.

(1) Optimize the curriculum and adjust the distribution of credit. On the basis of improving employment ability of personnel training requirements, considering the market demand, the curriculum system should pay attention to three aspects including public foundation courses, professional foundation courses, professional courses, should strengthen the experiment and training, entrepreneurial guidance, employment quality course credits, to meet the demand of stronger abilities of practice and innovation by the rail transit companies.

(2) Improving teaching methods and adopting multi form teaching methods. In practice, teaching methods should be constantly enriched and innovated to meet the needs of students with different interests and different receptive ability, and enhance their perception of rail transit specialty. The multimedia technology in classroom teaching should be enhanced. Moreover, professional knowledge would be imparted vividly through slide presentation, case teaching, driving and dispatching simulation. Case teaching and traffic simulation teaching can create an environment similar to the actual traffic management, and enhance students' ability to apply theoretical knowledge to solve practical problems.

(3) Step by step and multi-level to cultivate the students' professional quality. The professional knowledge education and professional quality training of the students can be combined organically. In the process of talent training, the abilities including professional ability, personal ability and professional development ability can be improved step by step.
Acknowledgements

This research was financially supported by the National Experiment Teaching Center of Automobile, and the Education and Teaching Project (Grant No: 2015JQYJG02, No: JGZ201501 Xiamen University of Technology.

References


