

Research on Teaching Reform of Logistics Engineering Major Based on OBE-CDIO Mode

Jun LI^{a,*}, Yajie Zhao^b

School of Automobile and Traffic Engineering, Wuhan University of Science and Technology, Wuhan 430081, China

^alj_whut1989@163.com, ^byajie980719@163.com

*corresponding author

Keywords: Logistics engineering, Teaching reform, OBE, CDIO

Abstract: As for the training requirements of high-quality compound talents under the emerging engineering education, the teaching reform of logistics engineering major is studied. Based on existing shortcoming analysis of traditional teaching mode for the logistics engineering major training, the teaching reform is researched based on OBE-CDIO mode, which adopts the achievement-oriented OBE teaching concept and encourages the active learning mode of CDIO. The OBE-CDIO mode can help the deep analysis of social, market and enterprise demand and locate the teaching objectives of logistics engineering major with the core of ability training. On the basis of OBE and CDIO mode analysis, some teaching reform suggestions for logistics engineering major are proposed to modify the existing shortcomings of traditional teaching mode in the teaching process.

1. Introduction

As an interdisciplinary discipline of management and technology, logistics engineering has a close relationship with other disciplines such as transportation engineering, management science and engineering. With the rise of informatization construction and e-commerce, the development of China's modern logistics industry has shown diversification, and the demand for logistics talents has also kept pace with the times.

The curriculum system of achievement-oriented education OBE (Outcomes-based Education) is student-centered, enterprise and talent-oriented, realizes teaching objectives by setting up teaching units, and evaluates the teaching effect and the rationality of curriculum setting by monitoring the degree of students' ability ^[1]. The CDIO (Conceive-Design-Implement-Operate) is a new mode of international engineering education and talent training emerging in recent years. Its core is to guide students with real projects as the carrier to learn in an active practical way, closely combine the cultivation of knowledge, ability and quality, and integrate theory, practice and innovation ^[2]. It provides a good framework and concept for students to construct active, practical, organic links between the learning courses. The students trained by this model are deeply welcomed by the society and enterprises ^[3].

The OBE-CDIO mode is integrated through the teaching and talent training system of logistics engineering major, with the goal of improving students' professional level and ability. It can help the students become compound applied talents who can be engaged in teaching and scientific research in logistics engineering related fields in enterprises, scientific research institutes and government departments. The core of the OBE-CDIO mode is to build the curriculum system around improving students' knowledge application ability for meeting the needs of enterprises for talent quality ^[4]. This mode contains the OBE concept as the guidance, building a talent training system with the quality of talent needs of enterprises and society, and realizing the connection between teaching process and practical application by CDIO concept. It can promote the application of professional knowledge in social practice, and is conducive to the improvement of the ability of logistics engineering major innovative talents.

2. The Shortcomings of Traditional Teaching in Logistics Engineering

2.1 Unclear Course Objectives and Lacking Planning Requirements

The existing logistics engineering professional courses are mainly curriculum-oriented, there are no clear teaching objectives. There is no clear plan for the specific professional abilities that students need to master after learning, and also how to realize and cultivate them. Many schools have the same curriculum setting for logistics engineering majors. Such curriculum is too old and not adjusted according to the development of the logistics market under the emerging engineering education. It leads to the lack of practical application ability for the students when entering the society and cannot quickly adapt to the actual needs of the industry and enterprises.

2.2 Lagging Curriculum Setting and Teaching Textbooks

With the development of logistics industry, there are many subindustries. For example, the highway has express delivery, express transportation, urban distribution and so on. Railways include the high-speed rail packages and China-Europe freight trains. New wholesales have Fresh Hema, JingDong 7fresh, Exfresh. Ecology field has JingDong, CaiNiao and so on. Equipment field has AGV, express cabinet, drones and so on. These splendid and colorful enterprises from time-to-time enterprising innovation, constitute today's logistics industry. On the innovative forms and operating systems of cutting-edge areas, the teachers of relatively blocked colleges and universities cannot quickly respond and change, so that the concept that has been seriously lagging behind in teaching. When the students enter the enterprise after graduation, they realize the lack of the operational changes of the enterprise. The university curriculum system cannot cultivate practice ability, but cultivate students to cope with the exam, good at answering. This cannot improve the students' own ability and meet the market demand for talent.

2.3 Relatively Limited Teaching Form

The traditional teaching of logistics engineering major is mainly taught by the teachers, and the content and form of the teaching are decided by the teachers. For students, this kind of knowledge learning is passively accepting the arrangement and completing the learning tasks. Teachers dominate, can grasp the course progress, and positively guide students. However, the “one speech hall” is formed. The main position of students is offset, and the quality of class is too closely related to the teacher's personal ability. In the past two years, the logistics engineering professional course has also implemented the new teaching mode of “flipped classroom”, which makes the students' study independently before class. Then the teacher and students work together for solving the problem. Although this mode emphasizes the student's main body of learning, most classes are not easy to master, and many of it is only form and cannot achieve the real purpose^[5]. Due to the lack of guidance and innovation ability of many teachers, it is easy to lead students to fail to form a complete thinking logic for the teaching content, making the classroom effect is not ideal. And it is difficult to mobilize all students to cultivate independent learning abilities in a real sense.

2.4 Imperfect Learning Achievement Evaluation Standards

The final score of logistics engineering major is usually determined by the final results and the usual results. However, in most cases, the usual results are only scored according to the attendance and roll call, and some various evaluation mechanisms should be added, and have a phased evaluation and feedback. Students can also correct and adjust their goals according to the phased evaluation and feedback, so as to gradually improve their professional ability.

3. Suggestions for Teaching Reform Based on OBE-CDIO Mode

3.1 Transformation from Subject Education to Target Education

In order to guide students to acquire the ability more in line with the needs of the society and the market, the teaching system should be constructed and the teaching design should be carried out based on the OBE-CDIO Mode. Colleges and universities should communicate with enterprises in

time, adjust the curriculum as appropriate, and carry out relevant teaching reform through the practical training platform between schools and enterprises. It needs to pay more attention to professional courses and practice, increase the proportion of these courses, and appropriately reduce the theoretical courses without practical significance and application value.

According to the needs of society and the market, the teaching of logistics engineering majors should pay attention to the initial work requirements of graduates and the ability to cultivate students' subsequent career development. Through the OBE-CDIO mode, it is applied to guide the composition of the teaching system of logistics engineering majors for improving students' professional and independent learning abilities. The target education sets the objectives to enable students to master the basic theory and knowledge of logistics management and engineering, transportation, electronic information. The basic mode of logistics enterprise operation should be understood. The development status and trend of logistics engineering field, also the planning and design of advanced logistics systems at home and abroad should be acquired. The students should have the ability and technology of logistics engineering project design, supply chain design, and logistics system design.

3.2 Changing Teaching Concept and Improving Classroom Mode

The classroom teaching and extracurricular learning must to be balanced. The teacher should guide students to learn knowledge independently, not only impart knowledge, but also strengthen students' independent learning ability. As for the students, they should become the master of learning which contains generating learning goals through the classroom, collecting and analyzing information after class.

Firstly, the role, goal and application of logistics engineering are explained and analyzed through actual cases to make students to understand better. Secondly, the group cooperation is adopted in the classes to study and discuss, and completing the learning tasks and objectives. These could further develop the students' communication, expression and collaboration skills, strengthen the students' team spirit and sense of cooperation. Thirdly, the students would be more active to consult the relevant materials and literature through sorting out the course's content results. It could help the students change from the passive acceptance of knowledge to the role of active research. And also, it would guide students to conduct independent learning and achieve the change from a closed classroom to an open classroom.

3.3 Combination of in-Class Knowledge and Extracurricular Practice Teaching

Combined with the development of logistics engineering majors and cutting-edge trends, students can independently search and sort out relevant content to discuss and communicate in the classroom, which can broaden students' horizons. The teacher acts as a guide to help students deepen understanding of these knowledges in the class. Through the process of searching for materials after class, students can associate the theoretical knowledge in textbooks with the actual content. This would strengthen students' information search and integration ability.

To promote the development of practical teaching, colleges and universities must provide a large number of financial reserves for practical teaching to build a practical base for students and teachers to use. After the construction of the base, it can be provided for enterprises and schools to cooperate to develop better technology for the society, and also provides a strong experimental place for the training of professional talents ^[6]. Teachers need to constantly improve their own level, share information with students, lead students to participate in scientific research projects. These could make students really participating in practical operation. Students should actively participate in various practical activities, communicate ideas with mentors, and constantly innovate technologies suitable for the logistics market.

3.4 Improving the Teaching Evaluation Mechanism

The comprehensive and multi-angle evaluation mechanism, i.e., “daily-final, online-offline, teachers-students”, is adopted. This mechanism can not only increase the external pressure of students' learning, but also stimulate the students' motivation of independent learning. It would

greatly reduce the previous surprise review behavior before the exam. On the one hand, the students' usual performance scores are evaluated through their classroom performance, classroom discussion process evaluation, attendance, comprehensive ability and other aspects. Secondly, the students' learning situation are evaluated in stages considering the usual classroom homework, group discussion, and mid-term evaluation. During the stage evaluation, some targeted guidance should be contained to strengthen the students' growth and development in the learning process. Also, the students could be divided into groups to supervise each other through the mutual evaluation of each group member. Together with scoring the group course content and appropriate bonus for a good group, this strategy can help improve the professional skills and increase motivation for self-directed learning. The details of evaluation mechanism is shown in Table 1.

Table 1 Evaluation Mechanism

Stages	Evaluation content	Evaluation purpose
At ordinary times (Process assessment)	Online class and offline class attendance status (indirect assessment)	Students' daily mastery, communication and phased achievements in terms of course knowledge and skills
	Job completion (quantitative assessment)	
	Group Participation Level (process assessment)	
Final investigation (Summative assessment)	Final result report (achievement evaluation)	Development level of thinking ability, academic attitude, norms and literacy
	Term paper or exam results (direct assessment)	

4. Conclusion

Cultivating high-quality, characteristic technical skills logistics talents with innovative research spirit is the core goal of logistics engineering. As for the training requirements of high-quality compound talents under the emerging engineering education, the teaching reform of logistics engineering major is studied based on OBE-CDIO mode. Some suggestions are proposed considering the target education, teaching concept, classroom mode, in-class knowledge, extracurricular practice teaching, and teaching evaluation mechanism. However, the teaching reform needs continuous improvement in the future teaching. The professional abilities of students should be continuously improved to meet the needs of the ability and quality of logistics engineering talents.

Acknowledgement

This research is sponsored by the Teaching research project of Wuhan University of Science and Technology “Research on the cultivation of innovation ability of logistics engineering major driven by discipline competition under the background of new engineering (2021X058).”

References

- [1] Luo J., Xiao S.H., Chen L. Research on the evaluation system of practical Teaching Quality based on OBE concept. *Computer Informatization and Mechanical System*, Vol.5, no.1, pp. 22-24, 2022.
- [2] Bukalova G.V., Dorofeev A.N., Novikov A.N. Organizational capacity of CDIO syllabus in actualization of the objectives of engineering education from regional perspective. *IOP Conference Series: Materials Science and Engineering*, Vol.786, pp.1-6, 2020.
- [3] Chuchalin A. Evolution of the CDIO approach: BEng, MSc, and PhD level. *European Journal of Engineering Education*, no.6, pp.1-10, 2018.

- [4] Zhou L.J. Research on Innovation and Entrepreneurship Education of Materials Major Students Based on OBE-CDIO. *International Journal of Social Science and Education Research*, Vol.5, no.1, pp.385-388, 2022.
- [5] Afrashtehfar K.I., Maatouk R.M., McCullagh A.P.G. Flipped classroom questions. *British Dental Journal*, Vol.232, no.5, pp.285-285, 2022.
- [6] J. Luo, “Research on Practical Teaching Base Based on CIM-CDIO Concept”, *International Seminar on Education Research and Social Science*, pp. 370-374, May 2019.