

# Research on Training Objectives of Civil Engineering Talents in Local Engineering Colleges Based on OBE Concept

Zhao Yang<sup>a</sup>, Liangli Xiao<sup>b</sup>

College of Urban Construction, Wuhan University of Science and Technology, Wuhan, Hubei, China

**Abstract:** The OBE concept is the concept of results-oriented education and the core concept of engineering education certification. Under the background of rapid industrial development, China has put forward higher requirements for talent training. However, at present, many colleges and universities, especially a large number of local colleges and universities, still have problems such as unclear positioning, insufficient basis and unreasonable standards for the training objectives of professional talents, which need to be studied and improved according to the OBE concept. Taking the civil engineering specialty of Wuhan University of Science and Technology as an example, this paper carries out relevant analysis from four aspects: the formulation basis, specific content, open channel and rationality evaluation of professional training objectives. The research results can provide reference for the research on talent training objectives of local engineering colleges.

## 1. Introduction

In June 2016, China successfully became a formal member of the *Washington Accord*, marking that the engineering education certification work in China has been fully affirmed internationally and the engineering education in China has taken another major step. The core concepts of engineering education accreditation are " Student-centered ", " Outcomes-oriented " and " Continuous improvement ". Therefore, engineering education certification requires Outcomes-Based Education (OBE).

The research on the concept of foreign OBE education began early, and systematic research was carried out from the aspects of generation, development and specific application [1-3]. However, China's research on the concept of OBE education began relatively late. In recent years, Chinese have gradually realized the role of OBE education concept in higher education, especially in higher engineering education, and made some useful explorations [4-11], we should also clearly realize that in the benchmark analysis with international engineering education certification standards, the orientation of professional talents training objectives in some universities in China is not clear. The basis for the formulation of training objectives is insufficient, and the talent standards set by the training objectives are not reasonable enough. As an important human resource in the strategy of " Made in China 2025 " and " Industry 4.0", the applied engineering talents trained by local engineering colleges largely restrict the speed and scale of industrial modernization.

In this context, it is an example of great theoretical value and practical significance to carry out research on

talent training objectives of local engineering colleges based on OBE. Therefore, taking the civil engineering major of Wuhan University of Science and Technology as an example, this paper carries out a research on the objectives of talent training based on the OBE concept, so as to provide reference for the top-level design of relevant professional education in local engineering colleges and universities.

## 2. Basic situation of civil engineering major of Wuhan University of Science and Technology

Wuhan University of Science and Technology is a provincial key comprehensive university co-constructed by the Ministry of Education. It is one of the national " Central and Western Universities Basic Capacity Building Project " selected universities. The civil engineering specialty originated from the industrial and civil construction engineering specialty of Wuchang Construction Industry School. In 1996, it recruited four-year undergraduates majoring in architectural engineering. In 1998, it was renamed the civil engineering major, focusing on the direction of construction engineering. In 2003, the professional direction of road and bridge engineering was added, and in 2010, the professional direction of Geotechnical and underground engineering was added to civil engineering. The enrollment of master's students began in 2000 and doctoral students began to be recruited in 2014.

<sup>a</sup> Corresponding author: yzwh77@163.com

<sup>b</sup> 605316713@qq.com

### **3. Basis of training objectives**

#### **3.1 College orientation**

The college adheres to the socialist direction of running a school, fully implements the party's education policy, follows the law of development of higher education, adheres to the cultivation of morality, takes talent cultivation, scientific research, social services and cultural innovation and inheritance as its own responsibilities, bases itself on the local area, serves the industry and faces the world, and is committed to building an internationally renowned domestic high-level teaching and research university. Cultivate high-quality talents with all-round development, solid basic theory, reasonable knowledge structure, innovative and entrepreneurial spirit, practical ability and international vision.

#### **3.2 Professional Resource Conditions**

Wuhan University of Science and Technology has been running a major in civil engineering for more than 60 years. It has a discipline platform such as a doctoral degree authorization point for second-level disciplines, a master's degree authorization point for first-level disciplines and the right to grant a master's degree in engineering. It has established a provincial key experimental teaching center, a provincial research and development center, as well as a research institute, a design research institute, an internship base and other teaching practice platform. Meanwhile, all professional teachers have engineering practice experience, which provides important support conditions for the training of high-quality applied talents in this major.

#### **3.3 Social demands**

At present, the country is implementing the Belt and Road strategy, and there is an urgent need for a large number of high-quality applied talents with an international vision and strong innovation and practical ability. Meanwhile, with the upgrading and transformation of China's construction industry, the practical application of a large number of new technologies and new methods, as well as more and more complex projects, the industry and enterprises urgently need a large number of high-quality applied talents with solid theoretical foundation, broad professional knowledge, strong practical and innovative ability, a certain international vision, a high sense of social responsibility and good engineering professional ethics, team spirit and comprehensive ability to solve complex civil engineering problems.

#### **3.4 Research and feedback**

Through special visits organized by schools and colleges from time to time, investigate the working status and performance of employers' graduates; use alumni gatherings, alumni back to school, graduate recruitment conferences, graduate QQ groups and other channels to collect graduate work information, and obtain the

evaluation of the training effect of the society and employers on this major; through the organization of talent training seminars involving responsible professor teams, professional teachers and industry experts, the social and industry needs are discussed, the research data of talent training in our school are analyzed, and the effectiveness evaluation of talent training in this major is carried out. The survey and feedback results as the main basis for the formulation or revision of training objectives.

### **4 Training objectives and opening channels**

#### **4.1 Professional training objectives**

The professional training objectives is to cultivate high-quality applied talents who can adapt to the needs of modern science and technology and economic development, develop morally, intellectually, physically and aesthetically, master the basic principles and basic knowledge of civil engineering disciplines, and be competent for the technical and management work of various types of projects such as construction engineering, road and bridge engineering, geotechnical and underground engineering through basic training of engineers. It has a solid basic theory, broad professional knowledge, strong practical ability and innovation ability, and has a certain international vision. It can be engaged in technology or management in the investigation, design, construction, management, education, investment and development departments of civil engineering.

It is expected that graduates will achieve the following goals in about 5 years: (1) To have a good dedication, social responsibility and engineering ethics, with quality awareness, environmental awareness and safety awareness, can combine engineering and social sustainable development. (2) To have a solid system of professional knowledge and lifelong learning ability, to adapt to the development of new civil engineering technology, to carry out innovative practice; good communication skills, team spirit and organizational management ability. (3) To be fit for an engineer or have related professional technical ability and conditions; can be engaged in planning, survey, design, construction, management, education and research development work as a high-quality engineering and technical personnel in design, construction enterprises, real estate, investment department, research institutes, government management departments. (4) To have international vision and good foreign language application ability, can carry out cross-cultural communication, competition and cooperation.

#### **4.2 Opening channels and measures for professional training objectives**

Teachers can understand the professional training objectives through Wuhan University of Science and Technology undergraduate admissions website, College of Urban Construction website, Wuhan University of Science and Technology educational administration integrated

management information system, training program and other channels. In addition, the college helps teachers understand the connotation of training objectives by organizing all professional teachers to learn training objectives, discussing the implementation of training objectives, participating in the revision of training objectives and other measures.

Students can also learn about professional training objectives through Wuhan University of Science and Technology undergraduate admissions website, College of Urban Construction website, Wuhan University of Science and Technology educational administration integrated management information system, training program booklet and other channels. In addition, this major through the enrollment publicity, freshmen education, professional teachers as class teachers, professional introduction, professional courses and lectures and other measures to help students understand the professional training objectives.

The community can understand the professional training objectives through the school undergraduate admissions website, urban construction college website. In addition, this major also widely introduces the training objectives of this major to the society through enrollment publicity, Campus open day, visiting employers, campus recruitment fairs, alumni gatherings, alumni returning to school and other channels.

## 5 Rationality evaluation of professional training objectives

### 5.1 The relationship between training objectives and college orientation and social and economic development on talents demand

The school 's talents training objectives is to " cultivate high-quality talents with all-round development of morality, intelligence, physical fitness and beauty, solid basic theory, reasonable knowledge structure, innovative and entrepreneurial spirit, practical ability and international vision ".This major cultivates " high-quality applied talents who can engage in technology or management in departments related to civil engineering survey, design, construction, management, education, investment and development ", which is in line with the school 's positioning.

With the implementation of major strategies such as the country 's Belt and Road, Central China Rise, and the construction of the Yangtze River Economic Belt, as well as the upgrading and transformation of China 's construction industry ; the industry has higher and higher requirements for the theoretical basis, professional knowledge, practice and innovation ability, international vision, social responsibility, professional ethics, team spirit and comprehensive ability to solve complex civil engineering problems. Therefore, the training objectives of this major meet the needs of social and economic development for civil engineering professionals.

### 5.2 Graduates ' main fields of employment and social competitive advantages

According to the classification employment status of civil engineering students of Wuhan University of Science and Technology in the recent 3 years, as shown in table 1, the graduates of this major are mainly employed in various enterprises of civil engineering, accounting for about 60%, which is consistent with the training objectives and main employment fields of this major. Among them, the proportion of students entering design enterprises is increasing year by year, reflecting the growth of students' professional comprehensive ability. More than 20% of the students study for graduate students, indicating that the graduates of this major have a solid theoretical foundation and professional knowledge, high comprehensive quality, and the ability to continue their studies, which is consistent with the training objectives of this major.

**Table 1** Classification employment status of civil engineering students of Wuhan University of Science and Technology in the recent 3 years

Year		2019	2020	2021
Civil construction enterprises	Numbers	138	129	121
	Percentage /%	53.28	63.55	55.25
Civil design enterprises	Numbers	4	2	5
	Percentage /%	1.54	0.99	2.28
Other civil enterprises	Numbers	8	6	6
	Percentage /%	3.09	2.95	2.74
Non-civil enterprises	Numbers	41	16	11
	Percentage /%	15.83	7.88	5.02
Government institutions	Numbers	8	4	21
	Percentage /%	3.09	1.97	9.59
Graduate studies	Numbers	60	46	55
	Percentage /%	23.17	22.66	25.12

From the feedback of graduates and employers, the main social competitive advantages of the graduates are having good self-learning and lifelong learning ability, having good humanities, social science literacy and a sense of social responsibility and mission, having a sound personality, physical and mental health, having good engineering quality and be able to perform professional responsibilities in a complex engineering environment.

### 5.3 Periodic evaluation and revision system of rationality of training objectives

The evaluation and revision of the professional training objectives are carried out simultaneously with the evaluation and revision of the training program. The school has established a regular evaluation and revision system for the training program, and comprehensively revised the training program every 4 years. Meanwhile, each major can make partial revisions to the training program every year as needed.

When carrying out the evaluation and revision of the training program, the school teaching guidance committee formulates guidance opinions, and the college establishes a working group for the revision of the training program and organizes specific implementation. The main person in charge is the vice president in charge of teaching ; the working group is mainly composed of responsible

professor team members, course leaders, professional backbone teachers and industry experts ; the rationality evaluation mainly examine whether the training objectives conform to the orientation of school personnel training, the resource conditions of the major, the questionnaire survey and statistical analysis results of professional graduates and employers, the evaluation and analysis results of the achievement of annual professional graduation requirements, and the evaluation and opinions of industry and enterprise experts in related fields on the training program. After the revised training program was examined and approved by the teaching guidance committee of the college, it was approved and implemented by the school office.

The evaluation and revision process of the professional training program is divided into three stages as follows: (1) Extensively solicit opinions and suggestions from teachers, students, graduates, employers, industry and enterprise experts on the training of professionals. (2) Revision of the training programme organized by the working group; after being reviewed by the College Teaching Steering Committee and proposing amendments, the first draft of the training program was formed. (3) convene the profession expert symposium, carries on the examination to the training plan first draft, revises the latter to report the school teaching steering committee to approve, finalize. In the past four years, this major has revised the training objectives of undergraduates in 2018, 2019, 2020 and 2021.

## 6 Conclusion

It is of great significance for the whole talent training system to formulate reasonable talent training objectives based on OBE concept. For local engineering colleges, scientific and reasonable determination of talents training objectives should be carried out from the following aspects:

(1) The formulation of training objectives should have sufficient basis, which can be carried out from the aspects of school orientation, professional resources, social needs and research feedback.

(2) Training objectives should be specific, clear, and should be open to teachers, students and society through a variety of channels.

(3) The evaluation of the rationality of the training objectives can be carried out by analyzing the relationship between the training objectives and the school orientation and the demand for talents in social and economic development, counting the main employment fields and social competitive advantages of graduates, and formulating the regular evaluation and revision system of the rationality of the training objectives.

## Acknowledgments

The Ministry of Education's Industry-University Cooperative Education Project (202102113046); the key project of undergraduate teaching research in Wuhan University of Science and Technology (2021Z016).

## References

1. D., Pradhan, (2021) Effectiveness of outcome based education (obe) toward empowering the students performance in an engineering course. *Biology & Philosophy* (2).
2. G. Thirumoorthy, (2021) Outcome based education (obe) is need of the hour. *International Journal of Research -GRANTHAALAYAH*, 9(4), 571-582.
3. M.K. Chan, C. CWang, A.A. Arbai., (2022) Development of dynamic OBE model to quantify student performance. *Computer Applications in Engineering Education* (5).
4. Y. Zhang et al., (2022) Applied Outcome Based Education to Engineering Courses. *Journal of Educational Research and Policies*, 4(9).
5. H. Niu, J. Fan, H. Yan. (2022).Research on the Integration of Subject Competition and Professional Course Teaching Mode Based on OBE Concept. *Frontiers in Educational Research* (16).
6. Y. Zhang, X. Wen, Z. Feng, J. Zhao, K. Wang, (2022). Influence on the Training Mode of Talents in Fire Engineering Colleges Based on OBE. *International Journal of Learning and Teaching* (2).
7. Q. Ruan, (2022). Research on Teaching Reform of Financial Big Data Analysis Course Based on OBE Concept. *Advances in Educational Technology and Psychology* (7).
8. J. Luo,S. Xiao, L. Chen, (2022). Research on the evaluation system of practical Teaching Quality based on OBE concept. *Computer Informatization and Mechanical System* (1).
9. H. Pan, B. Bao, J. Huang., (2019) Exploration and Practice of Flipped Class Mode for “Unit Operation of Mixing” Lecture Under the Outcome Based Education Concept. *Education Journal* (3).
10. Y. Wang, X. Dong. (2019) Reflections on the Teaching of English Listening Based on Obe (Outcome Based Education)..(eds.)*Proceedings of 2019 7th International Education, Economics, Social Science, Arts, Sports and Management Engineering Conference* (pp.2601-2604).Clausius Scientific Press, Canada.
- X. Shan. (2022).The Teaching Method of Theoretical Mechanics Course Based on OBE Concept. *Advances in Educational Technology and Psychology* (2).