

Exploration on the Training Mode of Innovative Talent in Construction Management in Local Colleges and Universities

Liang Long ^a, Yalun Ye ^b

School of Economics and Management, Guizhou Institute of Technology, Guiyang 550003, China.

^alongliang@vip.qq.com, ^byalunye@hotmail.com

Abstract

In recent years, with the rapid development of cutting-edge technologies such as artificial intelligence, Building Information Management (BIM) technology and Virtual Reality (VR) technology in the construction industry, the construction industry has an urgent need for innovative talents for professional management in construction. Construction management is an interdisciplinary major which combines engineering and management. The cultivation of high-quality innovative talents not only meets the needs for the development of the construction industry in the new era, but also the future development of Construction management. In this study, we explore the training mode of innovative talent in Construction Management in local colleges and universities from five training stages, based on the real training practice of the cultivation of innovative college students.

Keywords

Construction Management major; Training mode; Innovative college students.

1. Introduction

In September 2018, the State Council's issued a document on Promoting the High-Quality and upgraded mass entrepreneurship and innovation and pointed out "Innovation is the first driving force for development as well as a strategic support for building a modern economic system". There are a lot of young students with entrepreneurial enthusiasm and faculties with many research achievements in colleges and universities, which have become an important carrier of China's innovation and entrepreneurship development, and also a significant breakthrough for comprehensive reform of higher education.

Guizhou Institute of Technology is the only provincial university in Guizhou Province which is molded into a polytechnic institute focused on engineering, and also incorporate Science, Management, and Economics. In January 2017, Guizhou Institute of Technology was approved to be the member of the first group of "Model University" for deepening the education reform in mass entrepreneurship and innovation. In August 2017, Guizhou Institute of Technology, as the rotating chairman and the permanent secretariat institution, initiated the "China - ASEAN Innovation and Entrepreneur Education Alliance of Universities". Guizhou Institute of Technology adheres to The Outcome Based Education (OBE) mode, and also attaches great importance to the cultivation of students' innovative and entrepreneurial qualities and engineering practice ability, to cultivate high-quality applied talents with strong responsibility, exceptional technical ability, good managerial skill, extraordinary ability in practice and innovation for the society.

2. Objectives and positioning of Construction Management innovative talent training

The important goal of the innovation of Construction management is to promote the integration of engineering innovations, including innovations in management theories, organizations, systems, technologies and methods, and to address the interdisciplinary issues. [1] The training of innovative talents majoring in Construction management in local universities should be based on the ability of

engineering practice and integrate the superiority and development of the discipline with the characteristics of local economy.

Guizhou Institute of Technology began to enroll students majoring in Construction management in 2014. The training objectives and Outcome Guide (or Outcome Map) is based on the Outcomes-Based Education (OBE)[2] mode as well as the enterprises' needs (Outcomes) to develop the Curriculum of Construction Management, which is supposed to meet the needs of enterprises. Combined with the construction of Guizhou eco-tourism city, the construction of transport and logistics hub and the development of big data industry, the college students are better trained to acquire the quality of engineers and cultivated to strength ability of innovation and the ability of organization management. Part of the professional courses integrate with the training of innovation and entrepreneurship ability, inextricably bounding up with the leading edge of technological development in Construction management, like the construction engineering based on the application of BIM technology and PPP financing projects and etc, to develop students comprehensive application ability in multi-form training, and enhance students professional comprehensive quality, who are supposed to become the qualified candidates engaging in engineering project evaluation and feasibility analysis, investment and financing and cost control, project and construction organization management, operation and maintenance, etc.

3. Training mode of innovative talent majoring in Construction management

3.1 The quality and basic ability of Innovative talent

The outcome-oriented achievement of this stage is to cultivate students with excellent professional ethics, innovation spirit, dedication and social responsibility; to understand the social, cultural, global and environmental responsibilities and ethics of a professional engineer, and the need for sustainable development, to acquire and apply basic knowledge of science, mathematics and engineering and professional knowledge of engineering, management, economy, law, computer science in the field of the Whole-process project construction management. The education mode is mainly based on the combination of classroom teaching and online courses, and the lectures relates to cutting-edge research and technology in Construction Management. In the course plan, the general compulsory courses contain the general education curriculum modules and the basic professional skill curriculum module, and the extended-type public elective courses, as well as the professional elective courses concerning communication management are added. The course actively uses the new teaching methods like the Rain Class, the MOOC, the Flipped Classroom, etc. to improve the acceptance and interest of college students.

This stage of training has a good effect on the study attitude of college students as it can stimulate students' self-motivation. Students' dedication and social responsibility are nurtured in the long-term student work and organizational activities held in school. It provides effective guarantee for the later development of technical ability cultivation and innovative practice.

3.2 Innovative ability of technology

The outcome-oriented achievement of this stage is to cultivate students to master the ability to use systematic methods to design and evaluate operational effects; to make students realize that engineering construction plays an important role in the development of national economy, to acquire the capability to analyze and interpret data and to master technology and skills which are necessary for engineering practice. In this stage, college students majoring in Construction Management are supposed to have solid foundation in theoretical knowledge, master comprehensive professional knowledge, as well as have strong ability of engineering system operation and innovation. The education mode mainly is based on cooperates with the classmates who work together as a group. The teacher guides students to complete the professional projects, linking the theoretical knowledge with professional technical practice. In the course plan, the basic professional courses contain "Computer Language Design C", "Statistics", "CAD in Civil Engineering", "Principles and Applications of BIM Technology", "Information System and Information Management",

"Engineering Measurement and Valuation", and the related experimental courses, as well as "Building Architecture", "Engineering Structure", "Bidding and Contract Management", etc. Guizhou Institute of Technology also collaborates with industry-leading enterprises to cultivate college students together, using practical cases as a template for practical skills training, and hires experienced enterprise instructors to participate in students' practical skills training to figure out the objectives of the training together.

Guizhou Institute of Technology encourages students to participate in the Academic Science and Technology Society, the BIM Skills Level Certification Examination, etc., and then selects outstanding students to participate in competitions of Construction Management. Taking the major of Construction Management of Guizhou Institute of Technology as an example, the "BIM Workshop" is organized by Guizhou Institute of Technology but not included in the course plan of Construction Management to link the students' extracurricular activities with the training of academic ability and technical skills. In the past three years, more than 60 students in "BIM Workshop" have been certified by the China Graphic Society and the Ministry of Personnel Training Center as Building Information Modeling Engineer. The faculty of Construction Management guide students to participate in various national competitions of Construction Management and in the past three years, they have won 5 first prizes, 10 second prizes and 10 third prizes respectively, which greatly enhance students' professional interest and confidence.

3.3 Comprehensive application of practical ability and innovative thinking

The outcome-oriented achievement of this stage is to provide college students basic training to be engineers, to have students master the theories and methods of modern management, and effectively implement the practical application skills; to train students acquire the ability to communicate effectively with engineers, as well as with the public; and acquire the ability to demonstrate and apply the principle knowledge of Construction Project Management, and then students can be engaged in construction project management concerning decision-making, planning and whole-process management of construction project. The education mode is project-oriented, and students form project teams to fully investigate social needs, combine managerial theory with technical practices, and determine innovation goals of the project. The course plan contains comprehensive practical courses like "BIM Application and Construction Management Workshop", "Project Investment and Financing Workshop" and "Graduation Internship".

In the course plan of Construction Management of Guizhou Institute of Technology, the curriculum modules of "Comprehensive Quality and Development" requires all the students to participate in innovation and entrepreneurship training and provides financial support. In the two years, there are three students' innovation and entrepreneurship training projects which have been approved by the Ministry of Education, 12 provincial-level projects as well as 13 university-level projects, and 80% of the projects are consistent with the academic research area of the faculties in Construction Management of Guizhou Institute of Technology. At the same time, the faculties as well as students are both encouraged to actively apply for the 'Industry-education Integration and Cooperative Education' projects launched by the Ministry of Education and the projects cooperated with local enterprises.

3.4 Innovative practice ability training

The outcome-oriented achievement of this stage is to develop students' inter-disciplinary application ability and international perspectives. They can maintain a clear awareness in a globalized environment and shoulder their responsibilities competitively and responsibly. Focusing on the frontiers of Construction Management and social needs, Guizhou Institute of Technology carries out innovative training based on academic production and invention. The education mode is in the form of a student or student team + faculty, and the team leader and innovative core member are selected internally. The team conducts interdisciplinary learning and practice independently through the "Graduation Thesis (capstone)", the research projects and innovative training projects set up on the course plan. The project team works on innovation goals and tasks of the project, or even organizes

the inter-disciplinary team. Team building focuses on enhancing team communication as well as the communication with the industry and society.

After 3 years of innovation cultivation and practical training, the Construction Management major of Guizhou Polytechnic Institute is currently focusing on BIM technology, guiding students to participate in national professional innovation competitions and has won 2 first prizes, 6 second prizes and 7 third prizes. The guided students have published one core academic papers and obtained three patents.

3.5 Evaluation and improvement of innovation results

The outcome-oriented achievement of this stage is to cultivate students' awareness of independent learning and lifelong learning, and to have the ability to continuous learn and adapt to the development of innovation. The educational mode mainly aims at guiding students to improve their self-evaluation and urging them to make continuous improvement through developing students' innovative ability and the innovative achievement. The course plan of Construction Management major in Guizhou Institute of Technology contains the "Professional Test". It is the comprehensive practice which invites experts in school as well as in enterprises to conduct structural tests of professional knowledge, so as to help students to fill in the gaps in professional learning and build a sense of lifelong learning and continuous innovation. In addition, for innovative projects with practical applications in society and industry, students will be further guided to carry out innovative transformation and innovative achievement. And students are also instructed to participate in innovative competitions including the National Challenge Cup, Internet+, China College Students' Entrepreneurship Competition, etc., based on the former innovative achievement. The innovative achievements are supposed to be evaluated and improved and innovation ability is also enhanced through the competitions.

The graduates who major in Construction Management of Guizhou Institute of Technology and have fully involved in the cultivation and training of innovative talent have clear objectives for their career path, higher salary than the average, and excellent working ability and performance. The graduates are mainly employed in real estate enterprises, design institutes, construction enterprises and engineering consulting enterprises. Take the BIM Innovation Team of Construction Management as an example, the students of the team participated in the National Internet + College Students' Innovation and Entrepreneurship Competition on the basis of previous achievements and won the Provincial Silver Award and the Best Employment and Entrepreneurship Award, and finally won the National Bronze Award.

4. Conclusion

4.1 Team instructors (faculties) play a key role in the training of innovative talent.

First of all, college students begin to learn professional knowledge during the university, which make they lack the systematic understanding of the professional knowledge they learned and the understanding of industry status. According to the characteristics of students, Guizhou Institute of Technology guides them to apply BIM, VR, GIS and other technologies as the starting point, and carry out engineering practice and design under the guidance of faculties. The engineering practice and design is also based on the needs of enterprises and society, and is supposed to greatly improve students' innovation ability. At present, the shortage of instructors (faculties) has become a limitation for the establishment of students' innovation teams. Guizhou Institute of Technology plans to introduce enterprise instructors and form instructor committee for centralized guidance, so as to improve the guidance and management of innovation teams.

4.2 The training of innovative talent must be systematic and form the mechanism for it in colleges and universities.

The secondary colleges also need to formulate the training objectives and provide corresponding support for experimental facilities and equipment. The training of innovative talents makes both students and faculties have to cope with extra workload so that it would be difficult to start innovative

education without incentive mechanism, reasonable management system, and the investment of experimental facilities and equipment. At present, the Construction Management major Guizhou Institute of Technology has built BIM Laboratory, Bidding and Cost Laboratory, Gui'an BIM Innovation Center and BIM Innovation Space, with a total area of 1600 square meters, 150 high-equipped computers and more than 4 million investments for software. Experimental facilities and laboratories are open to students for innovation training, innovation competitions and capstones. Despite this, Guizhou Institute of Technology still cannot meet the needs of students and has devoted serious energy to laboratory facilities and develop effective system for laboratory management.

Acknowledgements

Guizhou Institute of Technology university education reform project (Project Number: 2014 jxgg04)

References

- [1] Chen Hu, Ning Yan: *Introduction to Construction Management* (Mechanical Industry Press, China 2018), p. 358-359
- [2] Information on <https://www.abet.org/>