

## Research on the Application of Real Project in the Training of Engineering Cost Professionals

Peng Zang

Civil Engineering Department, Wenzhou Polytechnic, Wenzhou 325035, China.

18657716677@163.com

### Abstract

The real project is introduced into the classroom as a teaching carrier, which provides technical support for theoretical teaching and realizes the connection between classroom teaching and practical engineering. This paper expounds the specific implementation steps of project introduction method teaching, and provides a new reference for the talent training mode of Engineering Cost Specialty by using scientific research to feed back teaching.

### Keywords

**BIM; Engineering Cost; Real Project.**

### 1. Introduction

With the information reform of construction industry, the market demand for cost talents is also changing, especially for the cost personnel who master new technology. As the project has the advantages of overlapping knowledge and skills points of many professional courses of engineering cost, complete data and information, and the adoption of new industry technologies such as BIM, the real project can be introduced into the classroom as a teaching carrier to realize the mutual connection between classroom teaching and practical engineering<sup>[1]</sup>. At the same time, the research group can also use the rich scientific research cases accumulated in the process of intelligent construction research and development to provide technical support for theoretical teaching. Secondly, the training building is located inside the campus of Wenzhou Vocational College, which provides convenient conditions for teaching, so that teaching can be liberated from the classroom, and students can study and investigate the new building technology and new technology from a close distance. In addition, the scientific research platform has a complete set of instruments and equipment, which can be used as the teaching prototype<sup>[2]</sup>. Through on-site explanation, demonstration, observation and operation, the theory and practice are more closely combined, the students' learning enthusiasm is stimulated, the teaching becomes more vivid and intuitive, and the content is closer to the reality, the abstract technical knowledge is easier to absorb and master, the teaching effect is better, and the teacher is truly realized. The interaction between students and the combination of theory and practice will help students understand the industry development and technology frontier in the field of construction engineering<sup>[3]</sup>.

### 2. Current situation analysis

With the industrial upgrading promoted by new technology, the construction industry is also undergoing major changes, and the development trend mainly focuses on the following three points:

#### 2.1 Application of BIM Technology

In April 2019, the Ministry of education, the national development and Reform Commission, the Ministry of Finance and the General Administration of market supervision jointly issued the pilot work of "academic certificate + several vocational skill level certificates" in Colleges and universities. The BIM (construction information model) professional skill level certificate established in this paper with the future development and demand of the construction industry as the guide has also become the first batch of pilot reform projects<sup>[4]</sup>. It can be seen that BIM Technology will play an important role in the future intelligent building.

## 2.2 Popularization of prefabricated building

With the transformation of the form of architectural development in China, construction cities pay more attention to green, environmental protection, humanities, wisdom and livability. Prefabricated buildings are in line with the characteristics of green construction and environmental protection and efficiency, and are becoming the focus of social attention <sup>[5]</sup>. Comprehensively promoting the development of prefabricated buildings will become the top priority of construction industrialization and informatization. The related knowledge of construction industrialization and prefabricated building has become the basic knowledge of architectural disciplines, and the training of related industry skills has become the new demand of talent training.

## 2.3 The rise of digital architecture

In the digital era, architecture will present the three new characteristics of digitization, online and intelligent. The whole process of architecture from virtual model to built entity to operation and maintenance will interact and promote each other. With the new changes and trends of the industry, new design, new construction and new operation and maintenance will be the new formats of the construction industry in the future.

With more and more attention paid to new technology in the construction industry at home and abroad, the industry needs more and more talents to master the new technology, but the scale of talent training is far from meeting the development trend of the industry. Wang <sup>[6]</sup> (2016) believe that the lack of adequate training is the biggest challenge for the construction industry to adopt new technologies such as BIM. Liu Xiaofeng (2010) <sup>[7]</sup> also pointed out that the lack of technical innovation talents has become the biggest limiting factor for the application of new technologies in the construction industry. The era of intelligent construction is bound to come, and the ability of construction personnel also needs to keep pace with the times, and relevant personnel training also needs to adapt to the changes of new industrial formats.

At present, the teaching and training of innovative talents in intelligent construction in our department needs to be strengthened. Teachers are accustomed to the fixed teaching content and teaching mode for many years, and lack of enthusiasm to introduce new technology, new technology and new materials into the classroom. Compared with teaching, teachers are more willing to put the same energy into scientific research.

## 3. Project oriented professional teaching

Based on the real project, we should promote the teaching reform of the original course of cost major, add new course of intelligent construction, pay attention to the cultivation of students' professional practice and innovation ability, and strengthen students' scientific research and social service activities.

### 3.1 Integrated practice of BIM graduation based on project

The research introduces the BIM (3D) model and construction organization design of the real project into the comprehensive practice of graduation, and the cost students complete the BIM (4D) model of "building model + cost" and "building model + cost + schedule" through design "BIM (5D) model, cultivate students' understanding of BIM concepts and the ability to use BIM technology. In the past, students' graduation comprehensive practice topics often focused on the preparation of project bidding control prices, and through the introduction of the project data, students did not need to spend a lot of time in the graduation comprehensive practice to calculate the engineering quantity, and concentrated time and energy on the optimization of construction plans, Unbalanced quotation design and economic evaluation of schedule control. This kind of comprehensive graduation practice can further cultivate students' ability to apply new technologies such as BIM to solve practical engineering problems, and promote the development of cost graduation design from the initial stage of "modeling and calculation" to the subsequent "BIM application and management".

### 3.2 Reform of cost calculation courses based on projects

"Structural drawing and steel bar calculation" is a typical representative of the measurement and pricing courses of engineering cost majors. It is a professional and practical course. It has the ability to recognize drawings, associating ability of steel bar structure and Rebar calculation skills have higher requirements. In the course of teaching in the past, it was often found that students showed poor ability to understand pictures, insufficient understanding of steel structure and association skills, and inability to truly understand measurement rules when copying formulas.

In order to effectively improve the students' ability to read maps and calculate the amount of steel bars, teachers can use the training building, a natural "training base" on campus. At the beginning of the semester, teachers should analyze the core skill points of the steel measurement business for completing the project, that is, the structural construction drawing reading ability and the steel measurement ability, and refine the curriculum knowledge points that are connected with it, that is, master the 16G series Atlas of flat method and calculation rules of reinforcement engineering quantity. On this basis, design course teaching content. Use the training building project as a carrier to promote innovation and reform of curriculum teaching. The specific implementation plan is shown in the following table:

Specific measures for the in-depth integration of real projects and the classroom "Structural Recognition and Rebar Calculation"	
Early semester	① Set up courses on the information teaching system, share the drawings, steel construction videos, pictures, models and other materials of the training building project, and upload courseware and teaching videos according to chapters.
	② Decompose and refine the resources of the training building project to design work tasks suitable for each class.
Before class	① Issue a notice, requiring students to watch the steel construction video learning, pictures, courseware and teaching videos of the project before lectures
	② According to the content of this class, consult the specifications of electronic atlas, learn the specifications of flat drawing and the structure of steel bars, so that students can improve their ability of independent learning and problem-solving
In class	① Import the construction drawings of the project, and arrange the work tasks of this lesson drawing and steel bar calculation
	② Explain the necessary theoretical knowledge. Aiming at the current situation where students have a weak ability to associate steel structure, use the BIM model of the training building to intuitively reflect the steel structure of each component
	③ Students complete tasks in practice, and teachers use information-based teaching systems to comment on results
After class	① Under the circumstance of ensuring safety, through on-site inspection of the training building site, the theory and practice are connected to deepen the impression
	② Post and correct assignments on the information teaching system

Rebar calculation teaching based on real projects uses real CAD drawings of the project as the teaching carrier, combined with the video, pictures, and BIM 3D models of the project's on-site rebar work, which changes the current situation of classroom practice where text descriptions are the main and drawings are supplemented, and students When faced with the actual engineering drawings composed of lines and digital symbols, I feel unable to start; at the same time, it can change the traditional scattered and partial chapter teaching method, improve students' overall and systematic understanding of steel bars, and effectively improve students' reading and understanding of drawings The ability of rebar calculation rules improves the ability to complete the actual engineering rebar calculation work.

### 3.3 Reform of cost management courses based on projects

"Project Cost Management" is one of the representatives of cost professional management courses. It is a comprehensive course integrating management, cost, and construction contract law. It aims to cultivate students' ability to implement project cost management at all stages of construction projects. The course covers a large number of professional knowledge systems and has strong social practice. Limited by traditional teaching thinking, most colleges and universities still focus on the study of theoretical and professional knowledge when teaching this course, while ignoring the investment in practical teaching. Since the training building project has the characteristics of complete technical materials, strong on-site sense, and covering main knowledge points, it is very suitable for case teaching and constructing a curriculum reform for training "Engineering Cost Management" with practical ability. Specific implementation methods-take the unit teaching of "claim management and settlement" as an example:

The knowledge points involved in this lecture include: the concept of claim, the calculation of the claim, the procedure of the claim, and the report of the claim; the skill points include: incident liability analysis, construction period claim calculation, cost claim calculation, claim report format, and claim process. For this class, the real claims that occurred in the training building project were introduced as the subject of the case. The students played role-plays. The students formed a team of 4, and the members played: (1) Construction company cost officer (2) Cost Consultation agency price clerk (3) Supervision unit administrator (4) Party A administrator. Allow students to use the theoretical knowledge they have learned to perform role-playing and simulate the practice of claim management after mastering sufficient information about the claim incident.

### 3.4 Open intelligent construction elective courses based on projects

In the context of intelligent construction, informatization and intelligence have become the themes of the development of various industries in the new era. This is both an opportunity and a challenge for our teachers and students. Therefore, our teaching goals should keep pace with the times, and promptly adjust and open some professional elective courses on intelligent construction technology, so that students can understand the development trend of the subject and cultivate their frontier subject ability.

Teachers can use the information and results of new technologies, new processes, and new materials accumulated in real projects to teach students the professional elective courses of theoretical knowledge and engineering practical experience involved in fabricated construction technology. This course mainly introduces the current development status and trends of prefabricated building components and structures, connection technology, design technology, and focuses on the application and practice of prefabricated building technology. In teaching, teachers can use information-based teaching tools to share the data resources of the project with students at any time. At the same time, students can conduct on-site inspections of the project to deepen their understanding of prefabricated building technology. Through the study of this course, students can comprehensively use basic engineering knowledge and professional knowledge to analyze and compare the development direction of future majors, and master the impact of new materials, new processes, and new methods in the engineering field on society, health, safety, law, and culture. Potential impact. Through theoretical lectures, case teaching, independent learning, practical investigations, exchanges and discussions, etc., students can understand and master the main technologies of prefabricated construction, and combine basic experimental theories with real engineering to achieve on-site knowledge of relevant principles. Verification and integration.

## 4. Conclusion

scientific research results are the key to the implementation of the "R&D back-feeding teaching" model. Only teachers who have a certain amount of scientific research accumulation can do well when introducing cases. If there is no abundant scientific research results, this activity becomes "passive water". Therefore, college teachers should pay equal attention to teaching and scientific

research, not only to emphasize the important position of teaching, but also to the development of scientific research. While carrying out scientific research work, inject scientific research results into teaching can realize the mutual promotion of teaching and scientific research. When real projects are introduced into teaching, teachers need to decompose and refine the resources of real projects. Before each lecture, it needs to be redesigned and reformed according to the content of the lecture. For example, the scale of the project is relatively large. When calculating the beam reinforcement, due to the limitations of the teaching content and teaching practice, it is impossible to calculate all the beam reinforcement works at one time. Therefore, it is necessary to segment the construction drawings of the beams, and select representative beams as the task of this lecture, so that students have time and ability to complete the task after listening to the theoretical explanation.

### Acknowledgements

(1) Research on the Application of "Intelligent Manufacturing Public Training and Service Center" project in the training of cost professionals.

(No. WZYFFP2019004)

### References

- [1] Sun Wei. Problems and Countermeasures of project-led Teaching in practice [J]. Journal of Henan Radio and Television University, 2008(21):86-87.
- [2] Zhu Cuimiao. Application of "Project Introduction, Task-driven" Teaching Method in computer Course Teaching [J]. Modern Computers, 2019(1):94-96.
- [3] Tian Han. Communication teaching [M]. Changsha: Hunan Normal University press, 2002.
- [4] Wang Chunyan. Research on Bim-based Practical Teaching Innovation of Engineering Management Major [J]. Journal of Jiamusi Vocational College, January,2017.
- [5] Jijian. Application of BIM Technology in whole-process Engineering Cost Management [J]. Jushe, 2012,10.
- [6] Wang Yilei. Research on BIM-based Cost Management Information System [J]. Construction Economy, 2016.08.
- [7] Liu Xiaofeng. Application Research of BIM-based Construction Process Management [J]. Journal of Management, 2010,06.