

# Analysis of the Reform of Practical Teaching in Engineering Management under the Background of Intelligent Construction

*Xiaoxian Qiu*

Hainan Vocational University of Science and Technology, Haikou 571126, China

**Abstract:** Intelligent construction, as a new generation of engineering construction mode that integrates information technology and engineering construction technology, is one of the important means to promote high-quality development of China's construction industry. Cultivating innovative and composite talents suitable for future intelligent construction development is of great practical significance for the development of China's digital economy and the transformation and upgrading of the construction industry. Based on this, this article analyzes the new requirements of intelligent construction for the practical ability of engineering management professionals in universities. On this basis, it elaborates on the existing problems and optimization strategies of practical teaching in engineering management majors in universities under the background of intelligent construction, aiming to further promote professional teaching reform and provide some reference and reference for colleagues.

**Keywords:** Universities, intelligent construction, engineering management major, practical teaching, reform

Intelligent construction is an inevitable direction for the reform, development, transformation, and upgrading of China's construction industry in the future. Therefore, in order to better adapt to this change, universities are paying more attention to the teaching reform of engineering management majors. The teaching of engineering management involves a relatively rich disciplinary system, including technology, economics, management, and law, which is highly in line with the talent demand for engineering management in intelligent construction. From the perspective of practical teaching, this article optimizes the talent training program for engineering management majors in universities, for reference only.

## I. New Requirements for the Practical Ability of Engineering Management Talents in Universities from the Perspective of Intelligent Construction

Practical teaching is the key to cultivating students' professional literacy and comprehensive abilities, and is an effective means to enhance their core competitiveness. Intelligent construction has put forward higher new requirements for this. As an important battlefield for cultivating various professional talents, universities should actively adapt to the trend of social development, integrate the concept of intelligent construction into the talent training system of engineering management, focus on cultivating students' engineering practical abilities, and thus cultivate them into new types of engineering management professionals who can better adapt to future technological and engineering development.

Specifically, intelligent construction requires engineering management professionals to have a certain composite knowledge structure of intelligent construction management. Intelligent construction is a new mode of engineering construction characterized by digitization, networking, and intelligence in the context of the construction industry 4.0 era. At the same time, it is also a positive response to the requirements of "accelerating digital development" in the 14th Five Year Plan for National Economic and Social Development and the 2035 Vision Outline. If we want to achieve this, we must have engineering software, big data, the Internet of Things and other technologies aimed at intelligence and industrialization as support and guarantee. Therefore, in this situation, in order to meet the needs of the transformation and development of the construction industry, engineering management professionals in universities not only need to have a composite knowledge structure of multiple disciplines, including management science, civil engineering, engineering machinery and other disciplines, but also need to have the ability to solve practical problems with mathematical thinking. Only in this way can they better adapt to intelligent production, intelligent survey and design, intelligent decision-making, intelligent services and other construction and management processes, in order to cope with the profound changes in the current construction industry.

## II. Existing problems in practical teaching of engineering management in universities under the background of intelligent construction

1. The content of practical teaching is not synchronized with the transformation and upgrading of the construction industry

With the continuous improvement of modern technology, China has now entered the era of digital economy. Intelligent construction has greatly promoted the optimization and upgrading of traditional construction methods, and has been widely popularized in the current field of engineering construction, which greatly promotes the modernization development process of the construction industry. However, from the current perspective, there is still a problem of "emphasizing theory over practice" in the teaching of engineering management majors in some universities. Even if students consciously cultivate their practical and innovative abilities, their practical teaching content cannot be synchronized with the transformation and upgrading of the construction industry. For example, digital teaching content represented by BIM technology has not been fully integrated into the existing practical teaching system of engineering management, making it difficult for students to access the latest technologies and knowledge in the industry. This can easily lead to a lack of market competitiveness

among students after graduation, and their practical abilities formed in school cannot adapt well to the needs of social development and job requirements.

2. The teaching staff is unable to effectively meet the teaching needs of the new situation

Teachers are the key to carrying out teaching work, and their own engineering practice experience and practical teaching ability will affect the learning effectiveness of students. Therefore, universities must create a professional teaching team with strong practical and teaching abilities for students, so as to meet the training requirements of new engineering talents in the context of intelligent construction. However, from the current perspective, many universities have introduced many high-level master's and doctoral talents to the outside world in order to further expand the scale and improve the quality of education. However, although they have received good theoretical knowledge and academic training, most of them directly enter universities as professional course teachers after graduation, without experience in working in related enterprises or practical engineering projects. Moreover, influenced by the overall environment, they may pay more attention to academic research on scientific research projects and lack research on engineering practice. Therefore, for most universities, the number of double qualified teachers with real experience in intelligent construction is extremely limited, which will to some extent weaken the cultivation of students' practical abilities.

3. Lack of motivation from relevant parties leads to a superficial integration of industry and education

The integration of industry and education is an important measure for the reform and development of vocational education in China at present. Its purpose is to further promote the organic integration of education and industry, form a positive interaction, and improve the service of education to economic development and industrial upgrading. However, in actual teaching, due to the lack of understanding among the relevant parties involved in the integration of industry and education, as well as conflicts of interests, many engineering management majors in universities have relatively slow actions towards the integration of industry and education. The linkage between them is mostly limited to surface forms such as order based talent cultivation and school enterprise joint construction of internship and training bases, and has not been able to achieve deep integration of industry and education.

### III. Optimization Strategies for Practical Teaching of Engineering Management in Universities under the Background of Intelligent Construction

1. Innovate the practical teaching curriculum system and optimize talent training programs

In the context of intelligent construction, universities should focus on students, adhere to output orientation, and continuously improve and optimize talent training programs. In the practical teaching of engineering management, universities need to face the requirements of intelligent construction and actively build a practical course system that fully reflects the special characteristics of engineering education, in order to further adapt to the needs of social and economic development for new engineering talents in engineering management. The practical course system is an important component of the talent training program for engineering management majors in universities. Its content should always be output oriented, and the OBE concept should be practiced. This is mainly to enable students to have professional knowledge and skills related to intelligent construction, thereby achieving effective integration between education and industry.

Overall, the practical course system for engineering management majors in universities based on the background of intelligent construction can include experimental courses, course design, innovation training, internships, graduation projects, and other content. Specifically, experimental courses mainly include college physics, engineering materials, engineering mechanics, soil mechanics, and foundation engineering, aiming to further improve the comprehensiveness and design of practical teaching.

Course design is aimed at helping students comprehensively and deeply familiarize themselves with project engineering work and management processes. It is an important reflection of professional characteristics, and colleagues are also an effective way for students to engage in interdisciplinary and innovative training for intelligent construction.

Innovation training mainly includes basic learning of innovation and entrepreneurship, innovation and entrepreneurship training, and compulsory vocational skills (including the learning and training of BIM engineers, intelligent construction engineers, cost engineers, and other courses). It is an effective means to cultivate students' innovation awareness and thinking.

Internship requires students to focus on artificial intelligence, intelligent management of engineering projects, and other aspects, forming a preliminary understanding of intelligent construction. This practical stage mainly includes understanding internships (such as understanding the industry, familiarizing oneself with the profession, etc.), course internships (such as engineering surveying, virtual design and construction, etc.), production internships (such as verifying, consolidating and improving the knowledge learned in relevant enterprises), and graduation internships (students enter the internship site to participate in practical work and use what they have learned to solve problems after completing all courses).

The graduation project is an important link for students to integrate and integrate the professional knowledge they have learned. It requires students to keep up with the forefront information of engineering management, in order to continuously improve their professional abilities to adapt to the development needs of intelligent construction in the construction industry.

2. Optimize the practical teaching system based on the needs of the intelligent construction era

In the context of the era of intelligent construction, BIM technology has been widely applied in the current field of engineering and construction, which is an important technological carrier to promote the transformation and upgrading of the traditional construction industry. Therefore, universities should actively build a virtual simulation teaching system for engineering management that integrates

BIM technology in accordance with the needs of the era of intelligent construction, in order to cultivate more engineering management professionals with BIM practical abilities. From the current perspective, many universities have begun to explore the BIM virtual simulation teaching curriculum system for intelligent construction, in order to help students understand the role of BIM technology in engineering projects.

Specifically, its practical teaching system is actually based on BIM technology, integrating aspects such as building structure, construction technology application, cost management, and comprehensive management throughout the entire process. For example, the “BIM+Building Structures” course is mainly aimed at cultivating students’ modeling and drawing abilities, mainly involving CAD, building architecture, engineering drawing, Revit technology, building materials, engineering structures, and other content. In the future, students can work as BIM engineers. The course “BIM+Construction Technology Application” is mainly aimed at cultivating students’ construction technology abilities, mainly involving engineering construction and measurement, prefabricated construction, virtual design and construction, etc. After graduation, students can work as technicians. The “BIM+Cost Management” course can cultivate cost engineers with strong measurement and pricing abilities, mainly involving installation engineering measurement and pricing, decoration and decoration engineering measurement and pricing, and other content. The course of “BIM+Comprehensive Management of the Whole Process” can cultivate project management personnel with certain project management and bidding abilities, mainly involving engineering project management, construction organization, engineering economics, construction regulations, and other aspects.

### 3. Improve the practical teaching level of the teaching staff and ensure teaching effectiveness

The teaching staff is an important engine for talent cultivation in intelligent construction, especially in the context of the new era, where the importance of knowledge and talent is becoming increasingly prominent, and the status and role of education and teachers are also becoming more prominent. Therefore, universities should increase the construction of their teaching staff and focus on improving their practical teaching level in order to better ensure teaching effectiveness.

Firstly, universities should strengthen the structure of teaching staff with a background in intelligent construction engineering, ensuring that there are intelligent construction enterprises or industry experts as part-time teachers in the teaching team, in order to smoothly promote research on engineering practice problems and academic exchange activities. Secondly, universities should adhere to the principle of “going out”, actively promote the integration of industry and education under the guidance of national policies, and achieve collaborative education between industry, academia, and research through cooperation with first-class intelligent construction enterprises. At the same time, it is necessary to encourage teachers, especially young teachers in schools, to participate in production and management activities in relevant enterprises, in order to continuously improve the engineering quality and practical ability of school teachers, and better integrate teaching content with the forefront of the construction industry chain. Finally, universities should build a “dual teacher” teaching team with strong practical skills through the “introduction” approach. For example, it can attract enterprises or industry experts to come to schools to give professional knowledge lectures, give classroom lectures, or guide students in their graduation projects; Real enterprise engineering project cases can also be introduced in the classroom to provide more resource guarantees for teachers to carry out practical teaching and enhance practical teaching activities. In addition, universities can also use studios and internship training bases jointly built by schools and enterprises to provide a platform for teachers to exercise their engineering practical abilities through industry education integration, in order to improve their comprehensive practical level.

## IV. Conclusion

In short, intelligent construction is not only a transformation and innovation of engineering construction technology, but also an important goal orientation for universities to innovate talent training programs. Therefore, as the main force of talent training, universities should keep up with the development pace of the social era and actively innovate the path of talent training for engineering management professionals. From the perspective of practical teaching, innovative practical teaching curriculum systems can be used to optimize talent cultivation programs; Optimize the practical teaching system in accordance with the needs of the era of intelligent construction; Measures such as improving the practical teaching level of the teaching staff and ensuring teaching effectiveness are taken to achieve this.

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