

Analysis on Reformation of Digital Management Education of Prefabricated Construction Project Under the Background of Intelligent Construction

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Abstract: Prefabricated building is an important building development mode at present. It can improve the development speed and production efficiency of the construction industry, reduce the labor intensity of construction, play an important role in the development as well as the modernization of the construction industry. Due to the late development of prefabricated buildings, the talent training of prefabricated buildings lags behind, causing the development of prefabricated buildings to not achieve its required target. Therefore, the characteristics of intelligent construction need to be incorporated, the education of prefabricated buildings needs to be reformed, the education regarding digital management of prefabricated buildings should be improved, and more professional talents should be nurtured.

Keywords: Intelligent construction; Prefabricated building projects; Digital management courses; Reformation of education

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1. Introduction

With the development of national economy, science and technology, and the strategic goal of sustainable development, prefabricated building construction has become an important development direction in current architecture. Prefabricated building construction promotes the scientific and mechanized development of construction engineering and provides a greater driving force for the development of the construction industry. Colleges and universities also need to keep pace with the development of the construction industry and improve the training of prefabricated construction talents. Especially in the context of intelligent construction, digital management courses should actively be developed based on prefabricated construction projects according to the latest needs of the current construction industry, so as to provide corresponding talent teams for prefabricated construction projects under intelligent construction.

2. Connotation of digital management of assembly type construction project under the background of intelligent construction

2.1. Intelligent construction

With the proposal of the strategic goal of “made in China”, it was proposed the strategy of building a strong country. The construction industry also integrates the latest development of modern technology into construction, make full use of network and digital technology to form intelligent buildings, and change the traditional extensive management mode. Intelligent building refers to the digitalization of all elements in the building. Intelligent building promotes the digitalization of the project through network interaction,

modeling and large-scale calculation, and realizes the integrated development of construction project planning, design, construction, operation and maintenance ^[1]. In this way, it provides green and intelligent building services and building models to the owners.

2.2. Prefabricated construction project

With the development of economy, China's construction industry has entered a new stage of development, which provides a huge driving force for the development of the national economy and also promotes the further development of related ancillary industries. However, with the increase of cost of labor, the deterioration of ecological environment and the increasing pressure of market competition, the traditional extensive construction method cannot meet the current development of the construction industry. In order to enhance the core competitiveness of construction enterprises, the construction industry continues to innovate new construction mode in order to further the development of prefabricated buildings. Prefabricated buildings emphasize the standardization and integration of design, and transfer the construction of basic accessories in traditional buildings to factories for processing. For example, the balconies, floors, stairs, and other parts of the building are assembled and connected after being transported to the construction site. Because the components of prefabricated buildings are processed in factories, the use of standardized equipment can ensure the standardization of component processing and improve the production efficiency of components. Besides, mass production can also reduce processing costs. Therefore, with its own development advantages, prefabricated architecture has become an important form in the current social development. However, there are still some limitations in the application of prefabricated buildings in China. Prefabricated building is the mainstream trend in the current development of the construction industry, which meets the development requirements of the construction industry. With the development of industrialization of construction, prefabricated buildings are gradually becoming popular. However, from the current implementation of prefabricated buildings, industrialization and process development are relatively slow, and the digital management mode has not yet been formed. It is still necessary to further the technical research and effectively solve various problems in the development and application of prefabricated buildings through the development of intelligent buildings ^[2].

2.3. Digital technology

Digital technology refers to the use of network technology, computer technology and other information processing and computing to ensure the efficiency and accuracy of information analysis. Digital technology can facilitate the transformation of all kinds of information to digitalization and form a digital management model. Digital technology is a type of virtualized program based on computer and network technology. At present, the digital technology of prefabricated buildings mainly focuses on building information modeling (BIM) technology, forming the construction of a full life cycle system, promoting information sharing, and making the prefabricated buildings fully apply the Internet of things (IoT) technology and intelligent technology for improvement. The digital assembly building mainly aims at BIM design, precision measurement and control, mechanical installation, information management and so on.

3. The principle and necessity of digital education of assembled building projects under the background of intelligent construction

3.1. Principles of digital teaching of prefabricated construction projects

In the education of prefabricated building projects, it is necessary to ensure uniformity in the design of syllabus. From the current situation of project-based teaching of prefabricated building construction in China, a systematic project-based teaching will be required, including aspects of project selection, design, participation in implementation and evaluation. At the same time, corresponding standards needs to be set

for each lesson to ensure that the teaching of each lesson is factual and based on evidence. Besides fairness and impartiality of teaching needs to be ensured, which will be conducive to the teaching evaluation. Secondly, the project-based teaching of prefabricated building construction needs to ensure the scientificity of the project. The quality of prefabricated construction project teaching directly affects students' theoretical study and development of professional skills. In the prefabricated building project, the rationality of the design needs to be and the relevance of the project to the teaching content need to be ensured, so that students can apply the knowledge in the classroom and expand students' thinking and ability through project participation ^[3].

3.2. The necessity of digital education of assembled building projects under the background of intelligent construction

Construction industry is an important industry in the development of our national economy, which directly affects the level of national economy and the development of upstream and downstream industries. Through the survey of China's gross national product, the proportion of construction industry is close to 25%, which shows that construction plays a vital role in China's economic development. However, there are still some flaws in the development of China's construction industry, such as outdated construction methods, traditional management concepts and high labor-intensity. At the same time, the construction industry is also a relatively heavy pollution industry in China. Therefore, the construction industry needs to focus on labor intelligence and digitalization, make full use of the development opportunities of the industrial revolution, formulate the development goals of intelligent manufacturing based on the national conditions, improve the traditional production mode of the construction industry, and improve the construction productivity. However, the transformation process from traditional buildings to intelligent construction is difficult, and talents are an important support to promote this transformation. Therefore, intelligent buildings have higher requirements for talents. However, due to the late development of intelligent buildings and prefabricated buildings in China, and the development of various fields are composed of multiple disciplines, including engineering, management, architecture and other disciplines. In recent years, the number of colleges and universities offering Engineering Management Majors in China has been increasing. In light of the development of intelligent buildings, it is also necessary to reform the digital teaching of prefabricated buildings and upgrade classroom teaching systems. With the arrival of intelligent construction era and the development of digital prefabricated buildings, it is necessary to optimize talent training and increase innovation in teaching mode.

4. Education system of digital management of prefabricated construction projects

4.1. Clarify the construction objectives of the teaching system

The digital management of prefabricated construction projects emphasizes that in the construction project management, it is necessary to combine all construction links, make use of network technology, computer technology and other information technology means and teaching methods, improve the construction project management ability, promote the communication between all participants in the construction project, and reasonably control the construction cost. It is necessary to promote the coordinated development of construction project management, so that prefabricated construction projects can achieve efficient, high-quality, green development, and be further popularized. Therefore, in the teaching of prefabricated architecture in colleges and universities, it is necessary to emphasize on developing the students' practical ability. Based on the current situation of assembly teaching in colleges and universities, the focus is mainly on theoretical and conceptual content, which leads to the lack of working ability and innovation of students after graduation. In order to improve the digital management teaching system of prefabricated construction projects, it is necessary to analyze from multiple angles and innovate the integrated, visual and network

technology teaching of prefabricated construction projects. It is necessary to effectively solve the problems of design, production, assembly and management in the construction production, and provide multi-dimensional and multi angle data information for the project work. It is necessary to ensure smooth implementation of various management works of the project and the effective implementation of management objectives, strengthen the sharing and transmission of information in project management, and ensure the improvement of assembly construction project management efficiency ^[4]. In addition, the digital teaching platform can be used as an important auxiliary tool in the digital project teaching of prefabricated buildings. The effective combination of project cases and information tools through visual simulation teaching methods and teaching means is conducive to changing the problems of unscientific teaching methods and non-ideal means of teaching in the traditional prefabricated building teaching. Besides, it stimulates the students' interest in learning, and improves the boring teaching atmosphere in traditional classroom teaching. In addition, it also allows students to carry out on-site operation in practice which was not possible previously.

4.2. Construction of digital management system organization for prefabricated construction projects

4.2.1. Information system

The construction of digital management system of prefabricated construction project includes information system, project display and data interaction system. Firstly, in the construction of prefabricated building management information system, cloud platform and mobile apps are the main information management carriers. In the cloud platform, the project information management is taken as the main reference for the system construction. The system needs to improve the analysis and maintenance of the basic information of the project and the data of construction materials, so as to better connect and integrate the information of each project stage, and optimize information management of the whole construction project process. BIM technology mode is applied to compress and restore data, so that the management mode can achieve lightweight development. Web pages and web browsers can be used to browse and analyze the floors and components of the building model from multiple angles to understand the information content of each component ^[5]. After completing the production of components, manufacturers should mark each component, so that each component can generate a two-dimensional code as the identification of components, which is conducive to the understanding and positioning of component information by users in all links of components. The teaching reform of this part is conducive to stimulate students' awareness of practical innovation, and can apply modern technical means to strengthen management innovation ^[6]. At the same time, component subscribers can also view the list and parameters of components through the cloud platform. Component manufacturers can input the production time, specification, completion time and other information of components through the cloud platform. In addition, the BIM model can also be used to visually observe and statistically analyze the progress of the project, display the status of components, and form a visual engineering progress observation system according to the planning requirements of prefabricated construction projects and the actual production progress of components. Through the construction of BIM model, the investment situation, project construction technology, payment amount, etc. in different stages of the project are limited ^[7]. It is necessary to build a professional knowledge base to collect, sort, classify and index various data of prefabricated building components, so as to form automatic deletion projects and preview and download documents ^[8]. Personnel, authority, and responsibilities can be allocated accordingly through the information management of institutions, personnel, processes and logs. Combined with the form of enterprise collection management, the branches of enterprise structure can be determined. Besides, the students' understanding of the content of construction enterprise management and the application of modern technical means can be improved.

The construction of mobile app mainly focuses on the application of logistics and warehousing. By

scanning the QR code of components, the information of components is directly transmitted to the cloud platform, and other related personnel can query the component information by logging in to the app. After the components are transported to the construction site, the material management personnel need to start the QR code for warehousing scanning, so that the status of components can be known by scanning the QR code in the later component application. After the installation of components is completed, it is necessary to scan the supervision QR code again to confirm that the components have been installed. The construction progress and overall image of the project can be queried through the QR code.

4.2.2. Project display system

The assembled project display system adopts the way of large screen simulation, and operates the system through login account and password. Students can conduct system simulation operations in combination with their assigned roles, and do a good job in data collaboration and data connection in all aspects according to the business development process. According to the requirements of prefabricated buildings, students are divided into different roles such as design department, construction department, component manufacturer, construction unit and transportation unit to carry out the actual operation of the project. Students can simulate the path and set coordinate points by themselves through Baidu map. Then, they can use GPS navigation equipment to simulate and analyze the logistics situation, forming a simulated dynamic tracking system ^[9].

4.2.3. Data interaction system

In the teaching of digital management of prefabricated construction projects, data exchange can be realized through the construction of cloud platform and related apps. Web service technology can be used to transmit data, and protect data through encryption algorithm to prevent data from being intercepted in the digital management system of prefabricated construction projects. The data interaction includes the data of component production progress, logistics and quality inspection. It is necessary to guide students to find data information through the software platform, and make project planning in combination with the data information ^[10]. Revit model can be combined with app to convert data format, lighten the model and transfer data. It is displayed on the software and cloud platform for users, so that users can log in to the system anytime and anywhere to view. Different systems and software can also be used through format conversion to avoid affecting the efficiency of information transmission due to incompatibility. It is necessary to use diversified systems and software to expand students' project development ideas.

5. Conclusion

In conclusion, the digital management of prefabricated building projects in the context of intelligent construction provides strong technical support for the development of the construction industry, improves the production efficiency of prefabricated buildings and reduces costs. It can realize the visualization and dynamic management of the project. The teaching of digital management of prefabricated construction projects in colleges and universities should be in line with the current development status of the construction industry, make full use of digital technology, cloud platform, visualization technology and other simulated teaching environment, provide convenience for project-based teaching, and help students master the most advanced construction technology.

Disclosure statement

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