The Value and Practice of Integrating Prefabricated Building Knowledge into Civil Engineering Courses

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Abstract: Against the background of industrialization and green development in the construction sector, prefabricated buildings have become the core direction for the transformation and upgrading of China's civil engineering industry. Integrating prefabricated building knowledge into civil engineering courses conforms to industry trends, stimulates students' learning initiative, helps students grasp the future orientation of the industry, and strengthens professional confidence. Starting from the background of industry reform, this paper analyzes the practical significance of integrating prefabricated building knowledge into teaching, and proposes specific implementation paths, so as to provide a reference for the teaching reform of civil engineering majors.

Keywords: prefabricated building; civil engineering; curriculum integration; teaching reform; talent training

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1.Industry Transformation: Prefabricated Buildings Leading a New Ecology of Civil Engineering

The traditional construction industry in China has long been plagued by high resource consumption, low construction efficiency and high labor dependence. Prefabricated buildings, characterized by factory prefabrication and on-site assembly, have become a key solution to industry dilemmas with the advantages of energy conservation, environmental protection, controllable quality and shortened construction period. In recent years, the state has issued a series of policies to support the development of prefabricated buildings. The 14th Five-Year Plan for Construction Industry Development clearly puts forward the requirement of "vigorously developing prefabricated buildings and promoting the modernization of the construction industry", and local governments have set mandatory targets for the proportion of prefabricated buildings in new buildings.

In industrial practice, prefabricated buildings have been widely used in residential buildings, public buildings, infrastructure and other fields, forming a complete industrial chain covering design, production, construction and operation. With the deep integration of BIM technology, intelligent construction and prefabricated buildings, the industry has an increasingly urgent demand for interdisciplinary talents with professional competence in prefabricated buildings. As the main base for cultivating core talents for the industry, civil engineering majors urgently need to adapt to industry changes, supplement prefabricated building knowledge in teaching, and realize the resonance between talent training and industry demand.

2.Classroom Empowerment: Dual Values of Integrating Prefabricated Building Knowledge

2.1 Stimulating Learning Interest and Solving Pain Points of Traditional Teaching

Traditional civil engineering courses focus on theoretical teaching with abstract and tedious content, which easily leads to students' weariness of learning. As an emerging field of the industry, prefabricated buildings are both technologically innovative and practically applicable. Its core logic of "building houses like building blocks", standardized factory production and modular design thinking are in sharp contrast to traditional construction, which can quickly attract students' attention.

Introducing typical cases, construction videos and 3D models of prefabricated buildings into the classroom can transform abstract professional knowledge into intuitive content. In the process of understanding new technologies and methods, students take the initiative to explore core knowledge points such as structural design, construction

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organization and management, and quality and safety control, which effectively solves the pain point of "disconnection between theory and practice" in traditional teaching and stimulates students' active learning awareness.

2.2 Clarifying Industry Orientation and Enhancing Confidence in Professional Development

At present, some civil engineering students are confused about the industry prospect, believing that the traditional civil engineering industry has entered a "sunset stage" and lacking confidence in career development. The rapid development of prefabricated buildings is injecting new vitality into the civil engineering industry, promoting the transformation from labor-intensive to technology-intensive, and spawning a series of new occupations such as prefabricated design engineer, precast component production manager and assembly construction technician.

Systematically introducing the development status, cutting-edge technologies, policy support and market demand of prefabricated buildings in the classroom enables students to clearly perceive the trend of industry transformation and upgrading, and understand that the civil engineering industry is not a sunset industry but a sunrise field revitalized by technological innovation. Meanwhile, making students aware of the interdisciplinary requirements for talents helps students clarify learning goals and career plans, and enhance professional identity and development confidence.

3.Practical Paths: Specific Strategies for Integrating Prefabricated Building Knowledge into Courses

3.1 Optimizing the Curriculum System and Adding Modular Teaching Content

Modular contents related to prefabricated buildings should be added to the core courses of civil engineering to realize embedded teaching. For example, in Concrete Structure Design, the connection modes and node design of prefabricated concrete structures are supplemented; in Building Construction Technology, the transportation, hoisting and assembly technology of prefabricated components are emphasized; in Engineering Project Management, the supply chain management, schedule control and cost optimization of prefabricated buildings are analyzed.

The module content should balance basic and cutting-edge knowledge, covering not only the core concepts and basic principles of prefabricated buildings, but also the application of BIM technology in prefabricated building design and the integration trend of intelligent construction and prefabricated buildings, so that students can master basic theories and keep up with the technological development of the industry.

3.2 Innovating Teaching Methods and Strengthening Practical Perception

The diversified teaching mode of "theoretical teaching + case analysis + practical operation" should be adopted to enhance students' sense of participation and experience. In the theoretical teaching, policy documents and industry reports are combined to clarify the development background and policy orientation; in the case analysis, typical prefabricated building projects at home and abroad are selected to guide students to discuss design highlights, construction difficulties and innovations; in the practical operation, BIM software and virtual simulation platforms are used to simulate component splitting and hoisting construction, and students are organized to visit prefabricated component factories and construction sites.

In addition, technical experts from prefabricated building enterprises can be invited to carry out special lectures and experience sharing, so as to build a school-enterprise collaborative teaching platform and deliver front-line practical experience and technical demand information to students.

3.3 Aligning with Vocational Needs and Integrating Literacy Training Objectives

In the teaching process, attention should be paid not only to the imparting of professional knowledge, but also to the cultivation of students' core literacy. Combined with the talent requirements of the prefabricated building industry, emphasis should be placed on cultivating students' modular thinking, systematic thinking, innovative thinking and collaborative ability. For example, in the curriculum design, a group task of "structural design of

prefabricated residential buildings" is set to require students to complete component splitting, node design and construction organization design through division of labor, so as to exercise professional skills and cultivate teamwork and problem-solving abilities.

Meanwhile, students should be guided to pay attention to the green, low-carbon and sustainable development attributes of prefabricated buildings, integrate the concept of ecological civilization into teaching, cultivate students' sense of social responsibility, and help students grow into interdisciplinary civil engineering talents with both professional ability and humanistic literacy.

4.Conclusion

The development of prefabricated buildings is not only a technological reform of the construction industry, but also an important opportunity for the teaching reform of civil engineering majors. Integrating prefabricated building knowledge into courses is an inevitable choice to adapt to industry development trends and meet talent training needs, as well as an effective way to stimulate students' learning interest and enhance professional development confidence.

Civil engineering education should take the initiative to align with industry changes. By optimizing the curriculum system, innovating teaching methods and strengthening practical teaching, students can fully master the knowledge and skills related to prefabricated buildings, laying a solid foundation for their future career development. At the same time, it will provide more high-quality interdisciplinary talents for the transformation and upgrading of the civil engineering and construction industry, and promote the sustainable and healthy development of the industry.

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