

Study of Cultivating BIM Application-oriented Talents in Civil Engineering by Production-education Integration

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Abstract. After the 19th National Congress of CPC, “deepening production and teaching integration”, “enterprise school cooperation to cultivate talents” has become the education hot spot in China. This paper analyzes the significance of production and teaching integration in the cultivation of BIM application type talents in colleges and universities, and the problems in the current cultivation of BIM talents in colleges and universities; focuses on the discussion of the main measures for the cultivation of BIM application type talents, including the revision of the cultivation solution, the construction of BIM curriculum system, construction of teaching staff, dual creation project application, practice base construction, innovation platform of enterprise school cooperation, etc., and all-round, multi-level and in-depth cultivation of BIM talents ;and explores the new cultivation models for application type talents in colleges and universities.

Keywords: Production and teaching integration; application type talents; BIM technology; cultivation model.

1. Introduction

The 19th national congress of the communist party of China put forward new requirements for China's education, and "deepening the integration of industry and education", "school-enterprise collaboration, and cooperative education" have become the focus of domestic education. Improving the quality of laborers, optimizing the structure of industrial talents and enhancing the competitiveness of laborers are inseparable from the cultivation of talents by universities; The cooperation between enterprises and universities and their support are indispensable for improving teaching quality, cultivating application-oriented technical talents in line with market needs, and promoting the industrialization of scientific research. The cooperation between enterprises and universities and their support are indispensable for improving teaching quality, cultivating application-oriented technical talents in line with market needs, and promoting the industrialization of scientific research.

2. Analysis on the Importance of Industry-education Integration in Application-oriented Talent Training

2.1 The Integration of Production and Education Promotes the Integration of Universities into Regional Economic Development and Industrial Transformation and Upgrading

At present, China is facing the pressure of economic transformation. Due to factors such as no longer labor dividend, increased labor costs and adverse international economic environment, China's economic growth rate has a clear downward trend. At present China's economy towards in order to improve productivity as the target of innovative economic transformation. New technologies and industries are booming, and the integration of new technologies and traditional industries is imperative. Regional industrial transformation and upgrading is accelerating, and a large number of application-oriented talents are urgently needed. Discipline in universities should gradually establish their own advantage, strengthen integration production and education, actively cultivate the market demand for new professional and technical personnel, thus promote the regional economic development and industrial transformation and upgrading.

2.2 The Integration of Production and Education Promotes the Long-term Development of Applied Universities

With the popularization of higher education into the stage of development, the newly built undergraduate course colleges and universities came into being. Most of the new universities are applied universities. How to create the school brand, we must get the school-running orientation, namely serving local economic and social development, to foster regional development "to use, good work, and to retain" compound and applied talents as the aim of personnel training and the fusion education throughout the training process, strengthen students' employment, entrepreneurship, efforts to improve education quality, make enterprise get talent bonuses from colleges and universities at the same time, so as to realize the long-term development.

2.3 The Integration of Production and Education Improves the Quality of Applied Talents Training

Application-oriented universities should cultivate talents with outstanding practical ability, strong ability to solve practical problems, and quickly adapt to the requirements of industries and enterprises. In the past, more emphasis was placed on school-enterprise cooperation, which was generally limited to recommending internship and employment of students and enterprises. The close connection between university talent training and enterprises was not enough, and the effect was not significant. Only let the enterprise to participate in college talent training, let production and education and training integration, production and teaching closely, can really improve the quality of application-oriented undergraduate college talent training, so as to achieve a win-win situation of resource sharing and mutual assistance between colleges and enterprises.

3. Analysis of Current BIM Talent Demand and Cultivation Status

The main problems of BIM application-oriented talent training in colleges and universities are as follows:(1) The cultivation form is simple. Some universities just teaching and related competition form the basis for BIM, teaching and competition most content is given priority to with BIM primary application; (2) There are no abundant teaching resources. In recent years, although the number of BIM teaching resources has gradually increased, most of them are not well integrated with engineering practice, lacking of actual cases of first-line projects, video animation and other teaching materials. (3) The teaching mode is traditional. The teaching activities organized by universities are not in line with the production activities of enterprises, the course contents are not in line with the production needs of enterprises, the practical teaching system is not perfect, and students cannot acquire the knowledge and skills to meet the needs of their careers. (4)There is a shortage of teachers. At present, most of the teachers are lack of enterprise BIM engineering experience, are separated from the latest industry trends of BIM, and lack of perfect ways for teachers to update and learn BIM theory and practical knowledge. (5) There is not enough hardware and software. BIM technology and software have higher requirements on hardware configuration. The teaching work related to BIM in universities is often limited by software and hardware conditions, which restricts the cultivation of BIM talents.

4. BIM Application-oriented Talent Training Measures

4.1 Revise the Talent Training Program and Improve the BIM Curriculum System

The application level of BIM technology is divided into basic concept and software operation, professional application and comprehensive application. The basic concept, software operation and professional application belong to the in-class teaching. In the part of in-class teaching, one is to implant BIM into relevant professional courses as an auxiliary teaching method, and the other is to set up BIM courses alone. Comprehensive application relies on comprehensive practical teaching and school-level school-enterprise cooperation platform. The BIM curriculum system is shown in table 1.

Table 1. BIM curriculum system

Course time	Course name	The content of the BIM
The first year	Introduction to civil engineering	Introduces the basic concept and the development prospect of BIM, application status and related software, plus one to make the students have a preliminary understanding of BIM.
The first year	Civil engineering drawing	With the help of BIM software, teaching can improve students' ability of map reading and spatial imagination.
The second year	Computer graphics and BIM modeling	The system introduces the concept of BIM, related software operation and preliminary application.
The second year	Building architecture	Based on BIM construction engineering design, complete 3 d modeling, completed a set of construction drawing design.
The third year	Application of BIM technology in building electromechanics	Application of BIM in electromechanical engineering
The third year	Civil engineering construction	BIM software is used to simulate and demonstrate the construction process.
The third year	Organization of civil engineering construction	Construction organization design, site layout and construction progress management based on BIM.
The fourth year	Estimated construction budget	BIM-based bidding stage bill of quantities and pricing documents preparation.
The fourth year	Comprehensive BIM training	Comprehensive application of BIM

4.2 Develop Rich Course Teaching Resources and Construct Flexible and Diverse Teaching Methods

We should improve the course materials and supporting teaching resources, and build a comprehensive and multi-level teaching material system that includes the main teaching materials, syllabus, electronic courseware, teaching video, case library, so as to provide an overall solution for the course teaching resources. In this process, the enterprise personnel should be fully involved in the real participation.

In addition, advanced multimedia technology is used to realize the transformation of BIM teaching content presentation mode, students' learning mode, teachers' teaching mode and classroom teacher-student interaction mode, and to construct flexible and diverse teaching methods. For example, micro-class, flipped classroom, case teaching method, project teaching method and role physical examination teaching method can mobilize students' learning enthusiasm and improve teaching quality.

4.3 Establish a High-level Double-teacher Team

On the one hand, enterprise BIM personnel can be employed as part-time teachers to teach some courses and guide innovation and entrepreneurship projects. On the other hand, we should actively train full-time teachers and send some young teachers to participate in various related trainings and lectures. Full-time teachers and front-line staff of enterprises can also be allowed to jointly complete projects under BIM to accumulate experience in practice. In short, we should strive to build a double-qualified teacher team with rich theoretical level and teaching experience, strong basic knowledge of industry and occupation and practical ability.

4.4 Actively Carry out Students' Second Class Activities

Since the application of BIM technology runs through the whole life cycle of the building and involves a lot of contents, it is far from enough to rely on classroom teaching alone. It is also necessary

to actively carry out students' second classroom activities. For example, encourage and guide students to participate in various subject competitions related to BIM to promote competition and training; Encourage students to actively apply for various innovation and entrepreneurship projects with the help of BIM technology, so as to learn new BIM theories and technologies; Encourage students to participate in the industry of BIM grade examination, further master negotiating skills.

4.5 Actively Build University-enterprise Cooperation Platform

With the new round of leapfrog development, Xiamen University Tan Kah College takes an applied development path unswervingly and actively promotes the integration of industry and education and school-enterprise cooperation. Since 2016, successively set up eight field university-enterprise cooperation platform, and developed the related policy professional teachers, students are encouraged to actively join the platform, promote the cultivation of applied talents. BIM team join field university-enterprise cooperation platform, the introduction of enterprise real project operation, making platform talent incubator foundation, between "employment cooperation in running schools, cooperation, cooperation, cooperation and development".

5. Summary

To the university of applied technology for transformation is the only way for the development of many of the newly built undergraduate course colleges and universities. Production-education integration and school-enterprise cooperation are important ways to achieve transformation and development and deepen teaching reform. First of all, school leaders and teachers must change their ideas and unify their thoughts, and take the integration of industry and education and school-enterprise cooperation as one of the basic concepts of running a school. Secondly, a diversified talent training mode should be established to integrate the integration of industry and education and school-enterprise cooperation into each link of talent training. Finally, we should actively build a variety of school-enterprise cooperation platforms, take real projects as the carrier, cooperate closely with local industries and pillar enterprises, and promote the in-depth combination of industry-university-research.

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