

# Building Information Modeling Technology-based Skill Competition

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**Abstract.** BIM technology skill competition is a new term that was introduced to the building industry in recent years and constitutes an inevitable outcome in the development of the information technology applied to the building industry. Comprehensive applications of the BIM technology will have immeasurably influence in the progress of science and technology in the building industry, significantly improve the degree of integration of building engineering, and bring enormous benefits to the development of the building industry. In the paper, based on the achievements of the BIM technology-based skill competition by the students of Guangzhou City Construction Vocational College during recent years, the mutual influence and promotion between the BIM technology-based skill competition and conventional teaching were analyzed, and suggestions were proposed for the integration of those two aspects in achieving further mastery.

## Background and Significance

As explicitly stated in the Decision of the State Council on Vigorously Developing the Vocational Education, national skill competition should be carried out regularly. The BIM is a new term that was introduced to the building industry in recent years and constitutes an inevitable outcome in the development of the information technology applied to the building industry. Comprehensive applications of the BIM technology will have immeasurably influence on the progress of science and technology in the building industry, significantly improve the degree of integration of building engineering, and bring enormous benefits to the development of the building industry. With the wide implementation and application of BIM technology in China, the transformational development and leap will take place in the building industry and some aspects of the building industry practice such as the thinking model, working pattern, working procedure, etc., will be changed and optimized. As a base for cultivating and transporting reserve talents to the industry, universities with the education reform not only advocate students to learn the professional knowledge, but also to continuously improve the ability to integrate theory with practice, cultivate the spirit of cooperation, and team collaboration capabilities, which really meet and adapt to the needs of the society [1].

## Emphasis on Skill Competition and Promotion of Professional Development

Before 2008, there was no skill competition to direct the vocational education. Most of the vocational colleges had deviated from their mission and blindly pursued the “top-up”. The courses assigned in the vocational colleges were quite similar to those in the ordinary colleges. The skill training and cultivation were neglected as a result of the use of vocational college students in a passive position. On June 20, 2008, the “Entrance examination for general education, skill competition for vocational education” was proposed by Huang Yao, director of the Department of

Vocational and Adult Education of the Ministry of Education, at a press conference of the Ministry of Education, which is a great innovation in the educational system of our county. By holding skill competitions in vocational colleges, the experience and practices of “working-integrated learning, college-enterprise cooperation and internship”, gradually explored in years in the development of vocational education with Chinese characteristics can be properly institutionalized and normalized to form the situation of “entrance examination for general education, skill competition for vocational education”, which is an imperative step for the vocational education to meet the needs of the economic and social development, represents the development of the vocational education with Chinese characteristics, and is a great institutional design and innovation of our educational enterprise.

Guided by policies and supported by college faculties and staffs, the students of our school have successfully participated in various skill competitions and completed some achievements. The “THS-Cup” BIM application skill competition, targeting the students of national high schools and universities, was hosted by the China Association of Construction Education (CACE), organized by the Shenzhen Tsinghua Sware Software Hi-Tech Co., Ltd., and substantially supported by the Professional Steering Committee of the Project Management and Project Cost Discipline of MOHURD and the Professional Teaching Steering Committee of the Committee of Higher Vocational Education for Civil Engineering and Construction. With the application of THS BIM series software, the competition aims to achieve a professional BIM coordination among the architecture majors of the colleges and improve students to the teamwork while enhancing their practical and innovative their abilities. On April 17, 2010, the final of the first “THS-Cup” BIM application skill competition of national universities and colleges was grandly held at the stadium of the Qingdao Agricultural University. Since then, the competition is held every year, and has been successfully hosted five times. Each year before the competition, the organizer, Shenzhen Tsinghua Sware Software Hi-Tech Co., Ltd., regularly publicizes the BIM ideas and competition procedure to the nationwide participants at different periods and different regions, as well as provides on-site training, remote network training, video training, self-study documents etc., so that the participants can fully understand the procedure and important parts of the competition and improve their software operation and application skills. The competition is warmly welcomed and has wide participation from architectural colleges and universities nationwide.

Nearly 2,500 teams from 266 institutions attended the Fifth “THS-Cup” BIM Series Software Modeling Competition and more than 2,900 entries were submitted to participate the online promotion election. The entries involved many fields of the lifecycle of BIM construction engineering including architecture, civil engineering, project management, project cost, construction environment and engineering equipment, energy-saving design, etc. After a series of competition, 256 teams from 212 institutions from Hong Kong and other different provinces, cities, and autonomous regions, were selected to the final stage. More than 1,000 students participated in the final and revealed their elegant demeanor. After a year of careful preparation, the team members from our school performed their respective duties with the clear division of labor and clear thinking, and did all they could in each individual competition with the knowledge and skills learned. Finally, our team was awarded with two second class prizes and three third class prizes this year.



Fig.1 Scene of the fifth BIM competition



Fig.2 BIM technology and education exchange forum

The “Dragon Graphics Cup” National BIM Competition is an important platform that encourages innovative practice, advocates innovative culture, promotes the informatization of the construction industry, facilitates the popularization of the BIM technology and accelerates the cultivation of talents. The competition was hosted by the China Graphics Society under the guidance of the China Association for Science and Technology, the Education and Training Center of the Ministry of Human Resources and Social Security, the China Academy of Building Research and other related government authorities and scientific research institutions. Encouraged by the faculties and staffs of our college, the students were rising up to the challenge and actively preparing for the competition.

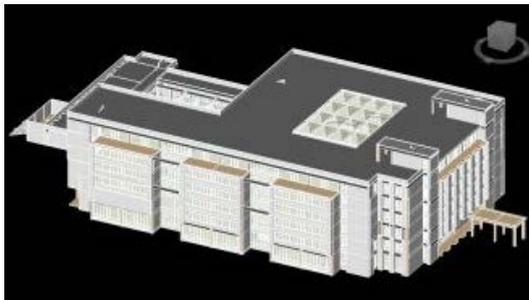


Fig.3 Student's entry

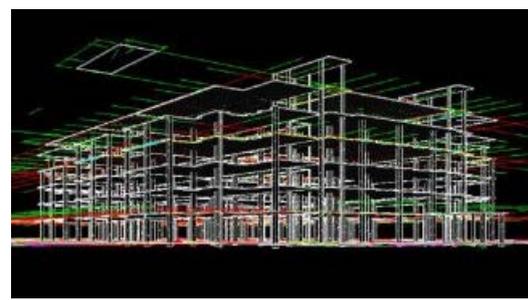


Fig.4 Student's entry

The “Dragon Graphics Cup” National BIM Competition constructs an ideal exhibition platform for the BIM technology applications in the construction engineering field in our country. It aims to promote technology exchanges and industry advancement. The successful competition with efforts made by first-class software suppliers, design institutes, construction engineering units, colleges, and research and development institutions, will further deepen into the applications of the BIM technology.

In recent years, the students' accomplishments in the BIM skill competition and leapfrogging learning attitude inspired by the competition among the students appears a qualitative leap! The students unconsciously influence each other. Participating in the professional skill competitions has become a habit resulting in inspiring the intangible learning interests which plays an important role in the vocational skills mastery. In addition, students and teachers have also significantly improved their professional skills and teaching abilities by getting involved in the BIM skill competition and counselling. Moreover, the school can get the incentive quota in the application for the next year's teaching and education reform project of higher vocational education if the college can successfully accomplish the skill competition assigned by the province and the state.

Before the teaching reform, although the “project-driven” guiding ideology involved in the teaching contents set, students could not evaluate their professional skills by the standards that meet the positions’ requirement after their completion of all the design work. Therefore, the conventional teaching reform was performed. The requirements and standards for the skill competition were adopted to evaluate the students’ performance, which incorporated the items of skill competitions into the contents of courses; therefore, students could follow these standards to evaluate their study. Under those evaluation systems, it is much easier for the student to obtain better accomplishments in future competitions.

### **Integration of Competition and Teaching**

Integrating the BIM skill competition into the conventional teaching, which takes the BIM technology as a breakthrough, absorbs the cutting-edge technology of building industrial development and reflects the demands of the enterprises for high-quality technical and skilled talents.

The guiding ideology of the BIM skill competition is employed to optimize the objectives in the cultivation of talents and is explicitly included in the “course-certificate-competition” -integrated curriculum and relevant vocational qualification examinations of the professional teaching plan. In order to cultivate the students’ professional abilities, relevant courses are reasonably integrated and the curriculum system is optimized. The strategy of “promotion of learning, practice, teaching, reform, and construction by competitions” facilitates the formation of the professional teaching and curriculum standards, the structure of the teaching staff team, and the improvement of the teaching organization pattern of work-integrated learning and school-enterprise cooperation. The contents of the BIM skill competition are organically incorporated into the practical teaching plan and process. The competition will help in guiding and promoting the teaching reform, inspecting the reform results, and integrating the skill competitions and the curriculum reform.

Each individual entry in the BIM competition matches specific skill requirements of a particular position. The different skills and requirements in the competition can be used to set the corresponding courses and create the specialized curriculum system. Additionally, the requirements and changes in the content of the annual BIM skill competition provide a dynamic adjustment basis for the reform of the curriculum system and the revision of course syllabus.

The specifications and technical requirements of the BIM skill competition are all in the frontline of industry development and the relevant guidance and training are frequently provided before the competition. By guiding the students to prepare for the longitudinal skill competitions at national, provincial, municipal, and district levels, teachers can get the opportunity to learn and educate themselves and therefore, significantly improve their skills.

### **Conclusions and Suggestions**

(1) To establish a new teaching evaluation system meeting the requirements of the BIM skill competition in the new era: Efforts should be made to reform the existing vocational education evaluation system, create a grade evaluation index system, improve the vocational education evaluation system, facilitate the healthy and sustainable development of the vocational education, break the theoretical learning-oriented evaluation system, and adopt a practical “course-certificate-competition”-integrated evaluation system.

(2) To get school leadership provides high importance to the BIM skill competition: The competition needs to invest a large amount of manpower, material, and financial resources.

Therefore, the school leadership must pay high attention to the competition and coordinate all aspects of school resources to support the competition.

(3) To mobilize the enthusiasm of teachers and students in participating in the competition: Preferential policies may be offered to the teachers guiding the students in the competition in regards to performance evaluation and occupational promotion. Participating eligibility restrictions should not be set for the school level competition, therefore, all the students, not just the top ones, have opportunities to participate in the competition, which will help form a benign cycle between the competition and conventional teaching.

(4) To publish the outstanding works of the BIM skill competition: Publishing the outstanding works achieved in the competition by the students in the textbooks compiled by teachers will highly enhance the enthusiasm and interests of the students to study.

## Reference

[1]. Baidu

Library [http://wenku.baidu.com/link?url=1sEgxHLI-pYpSavmRjXwFq3QYHENQPvEX7QMUG7zf9UL1Qkio1YNUVKhF-697vqk03FVGXnr-VzAak\\_eCPnjvd-0xDb3N1XWt1H2iXwFR2q](http://wenku.baidu.com/link?url=1sEgxHLI-pYpSavmRjXwFq3QYHENQPvEX7QMUG7zf9UL1Qkio1YNUVKhF-697vqk03FVGXnr-VzAak_eCPnjvd-0xDb3N1XWt1H2iXwFR2q).

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