BIM Architectural Design in Higher Vocational Technical Teaching

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Abstract

Not only BIM has a critical value in the engineering field and also widely used in talent development of Colleges and universities especially promoted by autodesk revit. By investigate BIM architectural design in higher vocational technical teaching, we try to find out the teaching model and method about how to change the BIM situation for leading the Building Information Modeling into teaching practice and improving the teaching quality in architectural design.

Keywords

BIM, Teaching, Revit.

1. Introduction

Great man once said, "Architecture is three-dimensional, as well as two-dimensional. Finally it's three-dimensional." It is widely expected that Building Information Modelling (BIM) will lead to changes in the performance of professionals in the Architecture, Engineering and Construction (AEC) sector, particularly with regard to architects and civil engineers [1]. BIM technology can play an important role in the construction that can be explored in a series designed from the beginning to raise the scientific and practicality of architectural design. In the new era, the traditional design methods can not meet the actual needs. BIM technology for teaching in this paper is unfold. Digital building information modeling software make the uncompleted building virtualizated that is different from traditional digital design. Now, construction and management can get help when the building designed. In fact, BIM is the establishment of a virtual building in the computer and a digital representation of the real world building components for the construction of a building component through digital technology.

In 2002, Autodesk purchased the company and began to heavily promote the software in competition with its own object-based software Architectural Desktop (ADT), which provided a transitional approach to BIM, as an intermediate step from CAD [2]. This traditional computer-aided design to compose the image represented by a vector object design approach is a fundamental change, which is capable of binding a number of plans to show the object. Currently BIM core modeling software company's main autodesk revit series. Educational researchers have long established that computer technologies are an important component to support project-based learning [3,4].

2. Revit software description

As one of a series of autodesk software, Revit is designed for building information model (BIM), which is divided into the following modules. Architecture Module that mainly used for building shape aspects of the design, including the volume model, terrain venue construction, three-dimensional design of building walls, doors, windows, floors, staircases, roofs and other basic components, rendering and animation to support the show. Strueture Module that mainly used for building structure design, including three-dimensional design group clumsy, columns, beams, plates, steel and other basic components and animation shows. MEP Module that mainly used in construction equipment design, including HVAC equipment, electrical equipment and drainage equipment to the three-dimensional design and animation shows. Revit is not only the three-dimensional design software, also supports the requirements for flat drawings showing, you can

complete a plan view of the paper label, large sample, and other functions. It has been upgraded to the 2016 version.

3. Advantages and disadvantages of Revit software in classroom teaching

3.1 Advantage of BIM Teaching

The teaching based on BIM effectively encourages students' interest in learning architectural design. Coupled with the influence of the old mode of teaching, studying architecture so that students feel professional courses boring, can not arouse the interest, it is difficult to focus on learning, leading to low efficiency and lack of proactivity. By BIM applications to attain situational mode, so that the original boring, complex and difficult knowledge into visual image, on the ground, both to help students master the theoretical knowledge, but also can be applied to the actual work the post, but also improve the ability of professional positions. By this way, students who are put into the teaching process become to the center of the classroom. Such teaching on 3D not only activates classroom teaching atmosphere, but also improves the efficiency of teaching and learning. In the end, it will play a positive role in college.

3.2 Simulation demo application in classroom teaching

Traditional building professional teaching process is still mainly based on lectures, instructors rely on dictation, writing on the blackboard and image presentation. At the same time, traditional classroom using CIA, architectural models, two-dimensional charts, video assisted instruction, etc. Nevertheless students are still more difficult to image, deep, intuitive rendering the building in mind. The new classroom get help from related software of BIM and underway three-dimensional digital animation simulation and demonstrating teaching. According to "Building the knowledge map", "architectural", "Architectural Drawing", "civil list quota valuation", "building construction" course to actual needs, teachers can be pre-designed presentation based on the needs of schools. Revit building information real world full range of simulation, creating a more realistic environment for the students teaching content with more intuitive acceptance as shown in the figure 1 below[5]. New teaching methods to enhance interactive learning, classroom teaching, more intimate active. By introducing teaching BIM technology, promoting the building professional learning visualization, digital level, but also compensate for the lack of training practice.

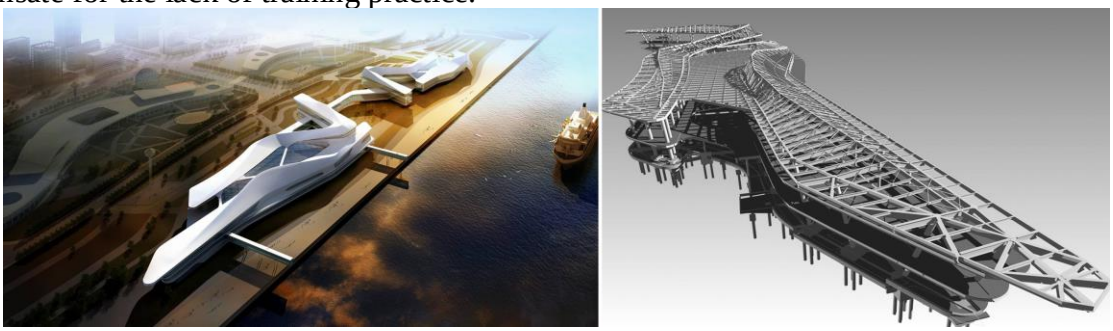

Fig. 1 Revit building information for teaching

4. Current problems and development direction

4.1 Students need some professional knowledge of building reserves

In order to support all these dimensions of BIM concept in the numerous software and application, it is evident that a common standard has to be used to share the information between so many different “players on the field”. There are many problems which have to be solved before this undoubtedly effective BIM process can be widely used in practice [6]. First of all, students need some professional knowledge of building stock, such as: building CAD, mapping and knowledge map, building structure, civil construction and other civil engineering courses and project management class, class structure, cost management and other courses. Secondly, the school can provide training center of origin and hardware resources to meet student learning and teachers teaching needs. Computer configuration to meet the operational requirements of autodesk revit. Such as: CPU Core i7 series

needs more memory and requires more than 8G, requires a separate graphics card, etc. In addition, revit version must be mainstream and the latest construction industry. Finally is the demand of teachers, requiring teachers to assume BIM teaching in addition to have a comprehensive professional knowledge, but also able to skillfully use software mainly autodesk revit, and practical experience in project participation.

4.2 Universities need BIM application talents

BIM talent demand structure can be divided into BIM standards talent, BIM tool development personnel, BIM professional applications talents, BIM technology teaching personnel four categories. BIM needs a largest number of professional applications talents, the most extensive coverage, and teaching personnel which is the basis of BIM personnel training and professional applications. BIM is the fundamental guarantee for professional applications personnel to meet the needs of society. With BIM technology and gradually extend deep into the pace accelerated in the construction industry, as well as the increasing social demand for BIM and construction industry professionals, all colleges and universities to implement reforms BIM high-end talent cultivation is inevitable. Universities have the professional competence of the teaching personnel is to achieve BIM used in teaching the most important force. College teachers lack practical ability of project construction, the lack of ability or lack of BIM application of new technologies, new management methods regenerative capacity after learning, the lack of use of the software project BIM experience BIM technology is practical teaching in the effective implementation of the adverse factor. BIM model covers the information content of a plurality of operating the project decision, design, bidding, cost, construction, etc., which require professional BIM application talents with the overall quality of a strong engineering design, construction, management, and even has a wealth of on-site management experience, culture BIM professional applications talents teaching personnel put forward a very high theoretical and practical capacity requirements. Therefore, the university teachers' professional quality and ability needs to be improved.

4.3 Countermeasures and suggestions of BIM technology in university teaching

Efforts to increase the popularity of BIM concepts and technologies to improve student understanding of BIM. Universities should hire renowned BIM experts or famous design institutes and construction units, particularly on the main professional engineer BIM directions employment units, for undergraduate lectures conducted BIM, BIM explore in practical engineering. Make students aware of their employment and the important impact of BIM after work, to stimulate students' enthusiasm for BIM.

Enhance the power of teachers to update teaching CAD, BIM will disperse into a plurality of related professional teaching civil engineering courses while introducing BIM to focus on in practice sessions, to enhance the ability of students to mastery. College teaching management should be introduced incentive policies to guide teachers to devote more effort to introduce new technology in the professional undergraduate teaching, new ideas, updating curricula and teaching content. Given the continuity of BIM throughout the building life cycle, it is recommended Professor BIM knowledge and techniques, not a simple one BIM course to solve the problem, but should be more specialized courses related (such as design, construction, etc.) combined with the actual targeted introduction of BIM technology to facilitate students' understanding and application. At the same time, it should be an overall increase in practical aspects of continuous use BIM software.

5. Conclusion

BIM technology being introduced into Architectural desgin lesson is the inevitable trend. All in all, BIM technology introduced into the teaching of university benefits obviously. The institutions allow students to keep up the pace of technological innovation for being familiar with the Building Information Modeling in advance. Besides, the universal of BIM will play a good role in students development and construction industry. The college will get rid of the old course patterns to truly

improve the quality of teaching by creating a three-dimensional, dynamic reality of the teaching mode, finally achieve the purpose of adapting to the jobs that required closely.

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