

Practical Research on the Teaching Path of Architectural Design Major in Colleges and Universities in China Based on BIM Technology

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Abstract: As a new technology, BIM technology has a very high practical application value in the teaching of Architectural Design Specialty in Chinese universities. However, at present, major universities have not integrated BIM technology system into the actual teaching. Therefore, this paper embarks on the application of BIM technology in the teaching of architectural design specialty, and systematically analyses the problems existing in the teaching of Architectural Design Specialty in Chinese Universities under BIM technology. The practical teaching path of architectural design specialty based on BIM technology is put forward in order to provide useful reference for exploring the teaching path of Architectural Design Specialty in colleges and universities.

1. Research background

1.1 Literature review

For a long time, the architectural design exhibition industry in China's universities has trained talents according to the thinking of large-scale specialties, positioned in large platform and wide caliber (Liu, et al, 2013). Compared with other majors in Colleges and universities, students majoring in architectural design have a wider scope of study, wider teaching ideas and a wide range of knowledge (Cui et al, 2018). This makes the students majoring in architectural design have more advantages in learning BIM technology. The job contact of BIM talent post is very extensive, so the post requires a higher comprehensive quality of people, similar to the post requirements of project managers now. For example, following the project work, assuming the corresponding responsibility of the project, participating in the whole life cycle management of the project and so on, there are many work contents and great complexity (Yang, 2017). Therefore, BIM practitioners are unable to undertake multiple projects at the same time, and often can only concentrate on a few projects. This means that the construction market will gradually recognize BIM technology in the future, and the market demand for BIM talents will gradually increase.

In recent years, the relevant departments in China have gradually increased their support for BIM technology, and BIM technology has gradually been recognized by the society. Many colleges and universities began to pay more attention to the research of BIM technology, and began to apply this technology to practical teaching (Li and Yang, 2017). At present, many colleges and universities in China have set up professional BIM technology research centers, and carried out research on teaching and practical application of BIM technology. Tongji University cooperates with Luban Software Company in practical application of BIM technology, engineering cost and computerized teaching (Cui et al, 2015). Shenyang University of Architecture has set up a special BIM Research Center Based on Revit software application. Tsinghua University and Guanglian Da Company jointly established the BIM Research Center to conduct in-depth research on BIM technology (Zhang et al, 2018). Luban software provides technical support for Dalian University of Technology, and helps Dalian University of Technology set up a special BIM technology training center, etc.

1.2 Purpose of research

At present, the main audiences of higher education in Construction Engineering in China are college students. Only by mastering the application skills and methods of BIM and other advanced technologies, can college students have stronger personal competitiveness in their future career and be recognized by employers (Zhang, 2017). At present, many universities in China have begun to set up special BIM technology research centers. However, most Chinese universities set up special research centers for social training and subject research, and did not apply the research centers to actual undergraduate teaching. At present, there are few universities that revise the original talent training program of architectural design and set BIM technology as the talent training program of undergraduate specialty. Based on this, this paper thoroughly analyses the current teaching situation of Architectural Design Specialty in Chinese universities, studies the existing problems in the teaching of Architectural Design Specialty in universities, and puts forward the practical teaching path of Architectural Design Specialty Based on BIM technology, with a view to providing reference and reference for the upgrading of teaching mode of Architectural Design Specialty in Chinese universities.

2. Application of bim technology in architectural design teaching

The practicality of architectural design specialty is relatively strong, which requires students to have strong practical application ability and spatial imagination ability in the learning process. At the same time, the teaching of architectural design course needs to teach students how to use drawing software. The application of BIM technology in the drawing course can improve the students' ability to construct and recognize three-dimensional graphics (Wang et al, 2018). Moreover, the use of building models to match two-dimensional drawings with three-dimensional buildings can reduce the difficulty of students' map recognition. In addition, the application of BIM technology can effectively cultivate students' cartographic ability and spatial thinking.

BIM technology has also been applied to steel structure courses. The course of steel structure is an important part of the course of architectural design. The main teaching contents include the principle of steel structure design and the design of steel structure. The application of BIM technology in steel structure course can help students quickly establish standard steel frame and steel structure model. Moreover, it can also realize the simulation of steel structure construction on site, and promote students' understanding of steel structure. This can not only improve the teaching efficiency of teachers, but also save the time to observe the construction site. In addition, the integration of BIM technology in steel structure course teaching can help teachers greatly enrich classroom teaching content and enrich students' knowledge acquisition.

3. Problems in the teaching of architectural design major in chinese universities under bim technology

3.1 Lack of systematic BIM teaching materials

Overseas, BIM technology has been officially introduced as early as ten years ago. However, in China, the time of recognition and application of BIM technology is relatively late. The early promotion and development of BIM technology in China included software application training, professional books and related meetings on Autodesk products. Since 2005, Autodesk has gradually cooperated with major Chinese universities, compiling and publishing a series of books on BIM technology. These books mainly introduce the theoretical concepts of BIM technology and the software tools developed by Autodesk based on BIM concept. This has greatly promoted the promotion, application and recognition of BIM technology in China. At present, many publishing houses have published books on BIM technology. However, at this stage, China still lacks the mature results of systematic research on BIM technology education. Moreover, there is a lack of relevant supporting textbooks on BIM technology teaching, and there is no mature and unified talent training mode in Colleges and universities.

3.2 The inappropriate curriculum of BIM in colleges and universities

At present, some universities in China do not have a deep and comprehensive understanding of BIM technology. Some colleges and universities even regard BIM technology as the basic course of computer, which is included in the student training program. Moreover, most universities only teach BIM as a basic course, and only teach students some simple BIM software operations. However, software can only be used as a tool. If students only learn the operation steps of software in four years of university, the significance of offering BIM technology course in university is not great. At the same time, if colleges and universities do not set specific and definite BIM technology learning objectives, then students will feel bored in learning, teaching effect will be greatly reduced. Therefore, universities should carefully design the content of BIM technology teaching and integrate it into professional teaching. In the specific teaching process, the teacher did not integrate BIM knowledge into the teaching content reasonably. This makes it difficult for students to use BIM software to solve specific problems encountered in learning professional knowledge and to better complete learning tasks.

3.3 Weak BIM teachers in colleges and universities

Many majors set up in universities are related to BIM, and each major has different professional requirements for BIM talents. Therefore, universities need strong BIM teachers to meet the professional teaching requirements. Only with enough BIM teaching talents, can colleges and universities train enough applied talents of BIM technology specialty. In every field of construction industry, BIM technology has been gradually promoted. Its application in various architectural fields has been gradually deepened, and people's understanding of BIM technology has also gradually deepened. With the gradual penetration of BIM, the market demand for BIM talents is also increasing. Colleges and universities bear the important responsibility of BIM high-end personnel training. It is an inevitable trend to reform the existing teaching mode and personnel training plan. Under the current teaching situation, colleges and universities must increase their BIM teaching faculty, in order to truly realize the reform and adjustment of the current BIM teaching mode. In addition, the existing BIM teachers in Colleges and universities still lack the practical operation of construction projects, which leads to their low practical application ability of BIM technology. This is also a very unfavorable obstacle to BIM teaching practice in Colleges and universities.

3.4 The existing teaching management mechanism is not perfect

At present, the existing teaching management mechanism in Colleges and universities is not perfect enough, mainly in two aspects. First, there are few projects and insufficient funds for teaching reform. Colleges and universities have insufficient understanding of BIM teaching, and research funds for related topics are relatively scarce. Therefore, the research funds on BIM in Colleges and universities can not meet the world-class expenditure demand, which has seriously affected the quality of BIM-related projects, but also has a negative impact on the effective use of research results. In China's first-class universities, although they already have advanced equipment and sufficient funds, they can successfully complete the research of the project, and have achieved satisfactory practical results in teaching applications. However, these universities did not share the research results with other universities. At present, the achievements that have been achieved are far from the goal of training architectural design professionals in Colleges and universities.

4. Probe into the practical teaching path of architectural design major based on bim technology

4.1 Cooperate with BIM professional company to jointly open practical teaching classes

Colleges and universities should cooperate with BIM professional companies in projects and adopt the mode of school-enterprise cooperation to train professionals. In the process of cooperation, colleges and universities should set up practical classes jointly with enterprises to train professional

BIM technicians for the society. Through such cooperation, we can not only meet the needs of society for professional BIM talents, but also make use of professional and senior BIM teaching talents provided by BIM professional companies. This can also help colleges and universities to solve the problem of BIM teaching talent shortage and weak teachers. At the same time, through School-enterprise cooperation, it can provide students with corresponding internship opportunities, promote students to carry out professional practice exercises, and improve the professional competence of students majoring in architectural design in Colleges and universities.

4.2 Organize BIM technology design competition to improve students' professional level

Colleges and universities should carry out various BIM technical competitions according to the BIM level and professional skill level of students majoring in architectural design. At the same time, students should be encouraged and guided to actively participate in various BIM competitions to improve their professional skills. Different BIM competitions have different emphasis. For example, some BIM competitions focus on investigating students' construction management skills, some competitions focus on investigating students' bidding ability, and some competitions focus on investigating students' modeling level. For these competitions, schools should encourage students to participate actively. We should encourage as many students as possible to participate in the practice, through this formal competition, select excellent students and excellent works, so that as many students as possible get exercise through participating in the competition. These competitions are designed to motivate students to actively study BIM technology. By participating in this type of competition, students' BIM technology application level can be greatly improved.

4.3 Integrating BIM technology into practical teaching, laying a good foundation for students to further study BIM

As an optional course of architectural design specialty, the application of building management software should incorporate the basic operation of BIM modeling software into its teaching, so that students can master some basic modeling knowledge about BIM through the course learning. In some compulsory courses of architectural design specialty, some specific applications of BIM technology in construction, bidding and planning stages are introduced. At the same time, in the teaching of professional courses, university teachers should try to do some preliminary and simple introduction about BIM technology. Through this teaching mode and curriculum, students can grasp the operation skills and methods when they operate BIM technology tools. And in the follow-up professional applications, can fully understand BIM technology. In this way, students will have a better introduction to BIM learning, and a clearer and clear goal and plan for future BIM technology learning.

4.4 Setting up BIM project design to improve students' BIM technology application ability

In the course of teaching professional courses, university teachers should set up some subject designs about BIM. Through these project designs, students can improve their ability to apply BIM technology. Specific project design can include engineering economy, construction management, bacteriostatic engineering structure calculation and other aspects. Students can master the application of BIM technology in bidding, construction simulation and project design by doing project design. This can also lay a good foundation for students to enter relevant jobs in the future.

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