Application of Case Teaching Method in BIM Learning

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Abstract: *The scale of BIM talent training is far from meeting the needs of the industry. The lack of BIM technical personnel is the biggest challenge facing the modern construction industry. There is an urgent need for universities to accelerate the process of BIM teaching reform. In order to explore reasonable and effective BIM teaching methods and methods, this article mainly uses Revit software as the medium to analyze in detail the application of case teaching methods in the BIM learning process, improve teaching quality and stimulate students' interest in learning.*

Keywords: *case teaching method, BIM learning, revit*

BIM (Building Information Modeling) is a general term for the digital expression of physical and functional characteristics of construction projects and facilities throughout their life, and the process and results of design, construction, and operation based on this [1].

At present, the scale of BIM personnel training is far from meeting the needs of the industry. The lack of BIM technical personnel is the biggest challenge facing the modern construction industry. The fundamental solution to the lack of BIM talents lies in the BIM teaching reform in universities. Therefore, it is very important to organize and carry out the teaching of BIM technology-related theories and practices, improve students' ability to use BIM technology to solve practical engineering problems, and deepen students' understanding of professional knowledge and understanding of the entire life cycle of engineering. The case teaching method has produced great functions in the teaching of many courses. This article explores the application of case teaching method in the learning of BIM technology through practical teaching experience.

1. The role and significance of case teaching method

1.1 The role of case teaching method

Case teaching elaboration is a heuristic, guiding and participatory teaching method that focuses on guiding students to change from focusing on knowledge to focusing on ability. In other courses, the main operating process of the case teaching method is to use case teaching through the correct guidance of teachers to create a good atmosphere for classroom teaching, promote students to actively participate in classroom learning, and maintain a good classroom atmosphere and classroom order . Through case analysis, students can master more in-depth classroom teaching knowledge and increase their ability to understand problems [2]. At the same time, in the process of implementing the case teaching method, teachers can better grasp the learning characteristics of students, solve the problems in teaching in a targeted manner, and formulate a more reasonable and scientific teaching plan. In addition, the case teaching method allows students to consolidate their professional theoretical knowledge and enhance their practical ability. It also allows students to have a better understanding of the current situation of the industry and the overall thinking of the work in the entire life cycle of the construction industry. Make up for the lack of off-campus internship opportunities and narrow the gap between the theoretical knowledge learned in the school and the actual scope of work.

1.2 Significance of case teaching method

At present, colleges and universities place too much emphasis on theoretical settings for professional courses, so students generally lack practical exercises. In addition, students' learning is too dependent on teachers, which leads to the weakening of students' practical ability. The case teaching method can be

used to analyze and summarize cases, find problems in examples, fully understand the teaching content through examples, and find out how to solve problems. Because BIM technology has the characteristics of simulation, visualization and coordination, it is easy to apply to the practical teaching of construction engineering. Students can use BIM software to build three-dimensional models and master the content and methods of project design. On the one hand, it can improve the ability of innovation. Students can boldly build project models based on their own understanding of the specification requirements and construction environment. On the other hand, they can increase their spatial imagination and deepen their understanding of various building components. Through the combination of cases and teaching content, students are highlighted as the main body in learning, and students' learning enthusiasm and practical ability are improved, and they can better master professional knowledge and skills.

2. BIM technology learning application case teaching method practice

2.1 Guide students to study the case carefully

From the student's point of view, familiarizing with the cases in advance can better grasp the key and difficult learning points in the formal classroom, provided that the teacher selects the cases according to the key and difficult teaching points in a targeted manner. It is hoped that before students enter the case project, they have a basic knowledge and understanding of BIM and the consolidation of theoretical knowledge points after project practice, so as to improve the professionalism of BIM. Students who have studied in the early stage of teaching and participated seriously in the process of case analysis and explanation tend to consciously discuss such issues, sometimes not limited to the content of the classroom and after-class questions. Abandon the traditional teaching methods of colleges and universities, and put the emphasis of BIM teaching on the practical part, that is, in the BIM course teaching, real cases are introduced as practical teaching materials. Let students use BIM software to solve actual engineering problems, and realize the real modeling, cost, simulation construction and planning of the project. The real case guarantees the authenticity of BIM operation, thereby improving the enthusiasm of students in learning [3].

For example, students must first understand theoretical knowledge before operating the Revit software to draw stairs. Teachers can provide students with a case that matches the stairs one or two days before teaching. This case is best seen and heard daily. Use real drawings and models to show students that there may be omissions or errors in the work process, so that students can further understand the matters that need to be paid attention to when building models and identifying drawings, and strengthen students' knowledge mastery through case analysis.

2.2 Cultivate students' practical ability

In the modeling study of Revit, some CAD drawings of the building model provided by the teacher to the students are used as the design basis. Students can freely design model schemes based on plan, section, and reinforcement drawings, etc. They can communicate with teachers or other students if they encounter problems during the design process. Teachers must regularly check the existing problems in the students' design and correct them in time. The students regularly exchange the skills and experience learned during the drawing process and learn from each other to make modeling more convenient and faster. The sorting and integration of data through BIM technology is more conducive for students to control the progress of all aspects of construction projects [4]. By using BIM to create a three-dimensional model and save various data, students can clarify the work content and tasks of each construction stage. Through the study of BIM case engineering, students can comprehend the whole life cycle process of building from design to construction to completion, make up for the shortcomings of extracurricular practice, and improve innovation ability and learning motivation.

2.3 Summary and analysis after class

In case teaching, it can be carried out according to the four processes of "publishing learning tasks, designing learning goals, implementing learning plans, process inspection guidance, and task summary evaluation". After the case operation training is over, the teacher must first systematically summarize the main knowledge involved in the model built by the students and the common problems that arise. It mainly summarizes the main points of the students' speeches, and points out the deviation and incompleteness in the students' analysis conclusions [5]. In the process of summarizing and summarizing, teachers must first focus on key issues. These issues can help students think more deeply about the

problem. Teachers need to provide students with new perspectives and correct operating methods when necessary. Secondly, teachers need to help students sort out their ideas. For students discussing controversial parts, teachers need to avoid simple evaluations. It is important to guide students to solve problems and find relevant materials in practice to ensure that they understand the solutions to such problems in future practical projects. At the same time, it is necessary to ensure that there will be no fatal errors in the project and cultivate safety awareness.

This step of summary analysis is mainly completed by teachers. The reason is that students do not have relevant experience and knowledge of engineering practice. It is also best to summarize and analyze each case project explanation or training. At this time, students have the best absorption of knowledge, and timely summary analysis can give a deeper impression of the case project. The process of summary analysis by teachers is also the process of students reviewing and summarizing classroom knowledge, which can help students further consolidate knowledge and improve classroom effectiveness.

3. Questions that should be paid attention to in the process of BIM learning with case teaching method

It is worth noting that each teaching method will have both advantages and disadvantages. In addition to making full use of the advantages, we should also find ways to take appropriate measures to make up for its disadvantages. In terms of the advantages of case teaching method, it can indeed stimulate students' interest in classroom learning in actual teaching and can play an active role in the process of cultivating skilled talents. However, the premise of case teaching is that students have a good learning foundation, and case teaching is a kind of enrichment and supplement to theoretical teaching. The ultimate goal is still to help students better apply theoretical knowledge in the future practice process and help students master the methods of applying theoretical knowledge. Therefore, the case teaching method cannot completely replace the traditional theoretical teaching method. The two should coordinate and complement each other to ensure that students can take into account the theoretical foundation and practical ability in the process of learning, and cannot use a single teaching method.

First of all, it is necessary to understand that learning BIM is not to randomly build various engineering models, but to better analyze the dynamics of the project. Understand the progress of the project and fully analyze the modeling data of the project to facilitate the optimization and improvement of the entire project based on the modeling.

Secondly, in the process of teaching BIM technology, it is necessary to realize that the teaching effectiveness of the case method mainly depends on the teacher's choice of cases and the active hands-on operation of the students. Good case selection is a prerequisite for effective case teaching, just as students have a good theoretical foundation. Case selection is the main content of case teaching, and its main position cannot be ignored in actual teaching. Therefore, in the process of course content design, teachers need to pay attention to the correct selection of cases. For BIM learning, the ultimate goal of teaching is to ensure that students have professional skills, master BIM technology proficiently and apply it to actual work. Therefore, when selecting classroom teaching cases, teachers should design classroom content around this point as much as possible, and choose cases that meet actual teaching needs. And starting from the actual needs of the society for BIM application talents, to achieve the purpose of training talents. In the actual teaching process, teachers need to give consideration to theory while focusing on practicality and applicability in order to achieve the best teaching effect.

4. Conclusion

Case teaching method is indeed a good recipe in BIM learning. It guides students to carefully study cases before class, concentrates on problems in class, and stimulates students' interest in hands-on. Therefore, students can truly understand the advancement of BIM technology and its use in example projects, and will be able to enjoy themselves in real work in the future. The teacher's summary analysis is also indispensable, which can wipe out some last doubts of the students. The more extended functions of the case teaching method in BIM are worthy of our development and exploration, to promote the development of students to BIM applied talents in all aspects.

Acknowledgements

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