

Exploration of BIM in Teaching Reform of Working practice for Civil Engineering

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Abstract

Working practice is the key content for undergraduate civil engineering teaching. The students innovation and practical ability are hoped to be promoted through practices. How to combine theory with practice through Working practice is a hard nut in teaching. In this paper, by applying the BIM to solve the absent of practice condition and the security is difficult to guarantee, it's important for the university to reform the teaching way and improve comprehension, which has practical significance to cultivate mixed mode talents.

Keywords

Civil Engineering; BIM technology; Working practice.

1. Introduction

Working practice is an important part of undergraduate teaching in civil engineering, it can cultivate student's abilities of combining theory with practice and improve the practical ability. Also it is practical teaching sections to bring up excellent e-commerce students. It has an important role in training applied talents who are engaged in engineering design, construction management and engineering cost. With the development of market economy, considering the safety and civilized construction and many other factors, there are very few enterprises which would like to provide internship opportunities for college. Therefore, practice content usually is only communion and study, and the effects on practice are sliding dramatically. Working practice has become a difficult and weak link in practice teaching of civil engineering specialty. The current working practice teaching mode has not adapt to the demand of the subject development, combine the BIM technology and working practice teaching and use the network platform to build laboratory of virtual simulation, through this teaching mode of working practice could improve the practice quality, so that the working practice of civil engineering will get out of a tight corner^[1].

2. The Situation of Working practice

2.1 The position of working practice in the teaching of Civil Engineering Specialty

Working practice is an important teaching means to cultivate students' practical ability and innovation ability. The main task of the working practice is after the systematic study of professional courses, especially after the study of the civil engineering construction technology and construction organization, students should go deep into the basic include engineering design, engineering construction, engineering supervision and project budget. By observing from their workstation and being supervised by trained staff and professional teachers, the students will strengthen the basic theory and professional technique knowledge.

Through working practice, the students go directly into the production line, to participate in the whole process of production. The practical can be a solid theoretical knowledge test whether students have learn, but also can improve the students' understanding of the theoretical knowledge. Through working practice, students can also learn new professional knowledge and master new technology, they can not only improve their own the actual operation ability, but also increase the ability to found the problem, analyze the problem and solve the problems. The practice brings about the theory of learning, which could cultivate students' interest in learning and innovation ability^[2].

2.2 The Situation of Working practice of Civil Engineering

2.2.1 It is difficult to contact the practice enterprise, and the quality of practice is difficult to guarantee.

It is a difficult problem to contact the practice enterprise in practice teaching. Especially in recent years, the enrollment of civil engineering is increasing. Based on the safety consideration of practice field, many construction enterprises are unwilling to accept internship students from collective organizations. Our school in 2017 to participate in the working practice of civil 14 grade 119 students, to arrange the collective working practice is very difficult, there is no local enterprises with the reception capacity of such collective working practice, even the groups take turns practice, cycle is very long, it will affect the normal production of the enterprise, so that the contact practice field is very difficult.

During the internship, teachers will spend a lot of time and energy on the safety problem of the students in practice, so that they don't put their heart and soul into guiding the students professional practice. Accordingly, the practice content is not systematic and complete, and students in the whole practice process can only look at the scene of the drawings and some basic information. The students also are swept past the construction scene, or sit in the classroom listening to a lecture. Students do not take part in the specific work, they can only be passively accepted and can not effectively apply the professional theory to solve practical engineering problems. There are some students who contact internship units by themselves, which are basically in the location of students all over the country. There are great difficulties in supervision and management. Some students may only deal with a practice reports, even rarely go to the construction scene. The quality of this kind of practice is not guaranteed.

2.2.2 The practice content is not systematic

It takes at least a few months to a few years for a construction project from construction to completion. The internship period of civil engineering in our school starts in September, and goes on to November. Their practice will last 8 weeks as last. During this internship, students can only understand the construction process of one or more sub projects in the whole construction process according to the project progress and it is difficult to understand the whole process of construction. This kind of practice to make the whole working practice lack of integrity and systematic.

2.2.3 The method of assessment is not objective

The scientific degree of the assessment system of working practice affects the enthusiasm of students in large part, and also affects the teaching effect. The current assessment method is students submit working practice reports , diaries and internship defense, and management evaluate the results according to the normative and defense situations reported. This method of assessment may lead some students to copy the text of other students' internship photos or internship reports directly, even by online excerpt can also complete a pass internship report. The student's internship enthusiasm is not fully mobilize, the students even think working practice is walking through the scenery. Also schools do not pay attention to themselves and do things carelessly directly ,that would affect the style of study, attitude to work and the quality of personnel training.

3. The Advantage of BIM Technology in Teaching Process of Working practice

Building Information Modeling, Building Information Management and Building Information Manufacture are based on the relevant information data of the construction project. Through the digital information to simulation the real information of a building, implementation of engineering supervision, property management, equipment management, digital processing, project management and other functions can be realized.

BIM technology integrates the parameter information in the process of design, construction, operation and maintenance to realize the visualization of the whole life cycle of building engineering information. It provides great convenience for the designer, the constructor and the owner, so that it is

convenient for all parties to coordinate and communicate with each other, thus greatly improving efficiency, saving cost and shortening the construction period^[3].

Due to the characteristics of civil engineering projects, such as long construction period, on-site safety and irreversible construction process, practice is often difficult to carry out. The appearance of BIM technology provides great convenience for solving the above problems, the real and reliable and economical and safe practice environment, which has the function of teaching practice are not available. Through the virtual simulation teaching, the problem of the students practice conditions, security is difficult to guarantee can be solved. The BIM technology enhance the professional skills of the students which plays an important role in cultivating students' professional civil engineering experience and innovation ability.

Our school cooperatively-run school with glodon Polytron Technologies Inc, Xi'an three software technology company, establish a BIM training center. The center of BIM makes the the full process of construction virtual are achieved. Using virtual reality, multimedia and network communication technology, the virtual engineering environment can be achieved by students. By using the software, better teaching effects could be got.

4. The teaching reform of working practice based on BIM Technology

The specialized characteristic of civil engineering is longer construction period and irreversible construction process and so on, which makes the quality of practice is difficult to guarantee. The use of BIM technology provides great convenience for solving the above problems, it can provide teaching function that field work does not get.

The virtual simulation teaching can solve the problems of students poor practice conditions and insecurity, it plays an important role in cultivating students' professional civil engineering experience and innovation ability. In the working practice of 2017, we will take the following measures to ensure the effect of working practice.

4.1 Select teachers to attend the BIM training and enhance the guidance ability of modeling

The teaching reform of working practice must rely on an excellent teacher team. Without the improvement of teachers' ability, working practice reform can not be completed. Therefore, increase teachers' training intensity and mastering advanced BIM technology is the first step of curriculum reform. Our school selects 6 teachers to attend the glodon BIM5D training, master of the BIM technology, so the teachers can guide the students according to the projects to set up a model to provide technical support for the reform of working practice.

4.2 Select typical engineering cases for modeling and establish macro concepts

Select the No.6 dormitory building and No.8 dormitory building to building with BIM, the formation of a three-dimensional view and take the students to visit the various parts of engineering structure and the various stages of the construction process. The students understand the construction process and compare with the actual field conditions, so that the students master the theoretical knowledge combined with engineering practice faster and better.

4.3 Scientific arrangement and the establishment of an internship model with virtual reality

The practice of concentration time is changed into a dispersed period of practice. According to the actual situation of t the No.6 dormitory building and No.8 dormitory building, the students should be arranged centralized practice in the construction scene. Construction process and construction stage of the project construction are studied by students.

Then complete the whole process of the construction with virtual simulation software, including measure the layout, select of construction machinery, master construction technology and construction management the key points of quality control, understand with the main point of construction and accept the whole process of the BIM5D model, then establish a project site construction drawings and so on. At last, master the method of project quantity computation, cost analysis and construction schedule management ect..

Until the practice of project construction come to a typical key step to repeat the above steps, a better understanding of the students who completed the virtual construction on the construction site will get. They will focus on training at the construction site to the key problems in the process of construction and put forward solutions. Not only the students in the field for a relatively short time, but also solve the teachers and the problem about construction unit on the internship on safety. After the practice, students could perfect virtual application conditions according to the construction practice of the construction process and technical points.

The students will learn professional knowledge in engineering practice and the matters needing attention, the theoretical knowledge is applied to real engineering practice, which can cultivate students' engineering quality, ensure the production the quality of teaching practice

4.4 Reform evaluation system, monitor the quality of working practice in all aspects and Strengthen practice process management

Change the past practice assessment methods based solely on practice report and practice defense grades compared to the single, increase in BIM modeling operations, increase the team work of bidding evaluation, increase the project acceptance of each other team work. At the same time, strictly control the number of practice students, by adding the practice scene in batches. In this way, make every student be able to listen to the teaching content and it is convenient for teachers to master the practice situation of students.

5. Conclusion

Through the teaching reform of working practice based on BIM technology, it will solve that single teaching contents, narrow practice content coverage, short teaching time, backward practice mode and other disadvantages. The all-round, full cycle of working practice is significant for engineering students to improve the perceptual knowledge and the formation of engineering consciousness. At the same time, it will improve students' creativity and practice ability. Applying BIM technology to working practice, it provides a new perspective for the working practice. This teaching reform can help students to understand the system of civil engineering and deepen the students' understanding of the cooperation spirit of the civil engineering team. Thus, the students' practical application ability and innovation ability would be greatly improved.

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