COMPUTER-AIDED EDUCATION IN BUILDING CONSTRUCTION COURSE

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ABSTRACT

Building construction is a compulsory course to civil engineering students. In additional to the building construction course in college, a practice of 4 to 5 weeks after semester is arranged for every student as an assistant of engineer in job site to foster and develop their abilities of handling practice problems.

Computer technology, which has the characteristics of visualization, recurrence, convenience and long-distance controlling, is applied widely both in classroom education and in practice phase. By computer techniques, such as Director, Authorware, Flash, photograph, video etc., the course will be taught vividly and visually. In order to reinforce student's practice ability in building construction, there is a practice phase after semester at least one month. By BBS, MSN and E-mail, teachers can help their students efficiently and in time from far away. After the practice, students will be arranged to have a conference to communicate their gains at building sites by multimedia computer technology.

If the coursewares can be made by an allied company, which unites computer company with college, it will not only bring advantage to college education, but also bring economic benefit to the allied company. And what's more, this kind of educational recourse sharing will bring social progress.

KEY WORDS

computer-aided education, building construction, computer technology, practice phase, building site

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INTRODUCTION

Building construction is a compulsory course to civil engineering students. It involves building techniques, techniques theories and organizational methods in every stage of civil engineering. It is important to students to master basic theories and have abilities to find and handle problems in practice. In additional to the building construction course in college, a practice of 4 to 5 weeks after semester is arranged for every student as an assistant of engineers in job site to foster and develop their abilities of handling practice problems.

TEXT

CHARACTERISTIC OF BUILDING CONSTRUCTION COURSE

The essential characteristic of building construction course is that it emphasizes both in theory and in practice. On one hand, this course includes many theory calculations, such as designing dewatering by well point, calculating time parameter of event diagram. On the other hand, it includes a lot of building technology, such as construction technique of driven cast-place-pile, method of putting up scaffold. It is only by vivid and lively teaching means, which will make student to understand and master knowledge more easily.

There is a practice phase in fabricating yard for students after they have finished building construction course. This practice achievement is very important to engineering students. Students in practice phase in fabricating yard will meet many questions just like in classroom studying. Some of their questions be solved by quantity surveyor of the building site, but students also need teachers to instruct them in time. There are two ways to arrange students to building site. Some students will be introduced by their teacher lecturer to in building construction companies. The others can also contact these companies by themselves. So students will spread all over the inland. The method to instruct students for teachers in practice phase is different from classroom teaching. It needs a kind of long-distance controlling technology.

POSSIBILITY OF COMPUTER-AIDED EDUCATION IN BUILDING CONSTRUCTION COURSE

The characteristics of computer technology are visualization, recurrence, convenience and long-distance controlling. It will not only meet the need of building construction course being taught in classroom, but also meet the need of instruction in construction practice.

Before multimedia technology applying in education, there are some traditional methods, like video technology. Because of several limitations, the effect of video using is not very good. One of the limitations is the video technology its own shortcomings, such as its less pixels resulting in blurry image. Another is because of the complex building site, which will result in too many matters in screen. The other is the course arrangement that videotape usually be concentrated played. While playing videotape, about several construction techniques will be concentrated in 45 minutes. Many of the students will be puzzled in learning too much new knowledge in short time.

Now, along with computer technology's advancement and popularization, many multimedia methods can be applied in classroom education. In the multimedia environment, people have graphics and text at the same time, and can also add the photograph, animation, good-quality sound, and full motion video. Videotape and photograph usually used in foretime can be played in computer. Teachers can make their teaching materials into PPT to increase their contents and improve their teaching effect. The most important thing is that normal people can use popular computer technology. Teachers can make building construction techniques into animation by present-day computer techniques, such as Director, Authorware, Flash etc. by themselves. Some software accessorial functions, like dynamic steps in PowerPoint, can also bring convenience to classroom education.

In order to reinforce students' practice abilities in building construction, there is a practice phase after semester at least one month. During this period, some students will be sent out to look for building sites, and thus the building sites may be throughout the country. By MSN and E-mail, teachers can help students efficiently and in time from far away. In the process of the practice, some students who have equipments like digital camera or vidicon will be advised to take pictures or video. After the practice, students will be arranged to have a conference to communicate their gains at building sites by multimedia computer technology. By this way, every student will get twice the result with half the effort.

CONCRETE USAGE IN CLASSROOM EDUCATION

The course of building construction has two main parts: technical theories and organizational methods. By computer software techniques, such as Director, Authorware, Flash, photograph, video etc., the classroom education will be taught lively and visually in both parts.

Main parts in building construction technical theories are pile foundation work, concrete work, prestressed concrete work, masonry work, structural steelwork, scaffold work, structural hoisting work, waterproofing work, embellishment work. These chapters have no affiliation with each other. Not like other pure theoretic courses, building construction course is more practical than theoretical. Students will have difficulties in understanding textbook contents only by teachers' oral instructing and simple pictures in book.

For example, the construction technique of bored pile in textbook, as traditional teaching, it will be taught by teacher's oral teaching and students' look at book. For every student's different concentration and intelligence, sometimes he/she will not get well teaching effect. If the technique is taught by teacher's drawing on the blackboard, it will waste too much time in drawing. By modern computer technology, such as the software FLASH, some of the bored pile construction steps will be animated as follows:

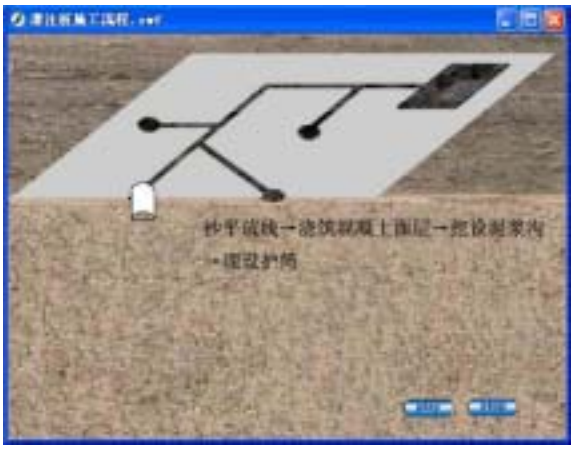

Figure 1: The fourth step of bored pile construction technique is to mine surface casing.

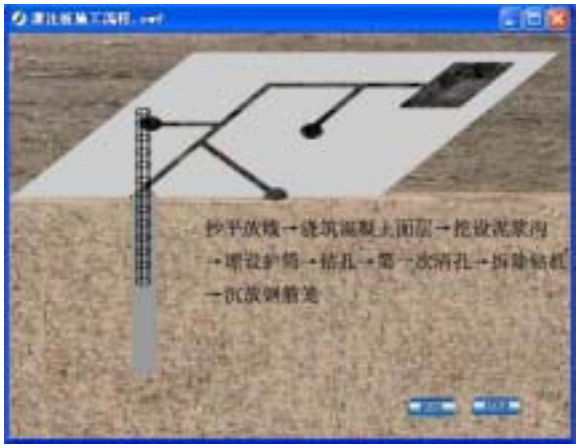

Figure 2: The eighth step of bored pile construction technique is to install steel reinforcement cage.

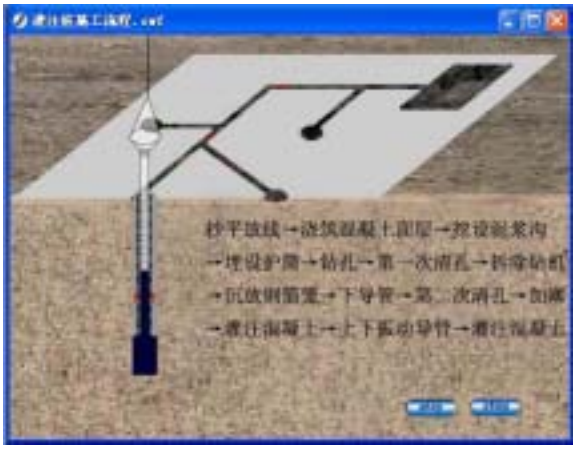

Figure 3: The fourteenth step of bored pile construction technique is to pour concrete.

A teacher in classroom education will arrange this content in two parts. At first 30 minutes, textbook material should be instructed by oral. And then at last 10-15 minutes, the FLASH can be played by computer, which can make students understand more easily.

Perhaps it is difficult for every teacher to master these new computer techniques, especially for some older teacher. By using some powerfully accessorial functions of software, like in the famous software Office's PowerPoint, dynamic steps function can also bring convenience to classroom education. For example in teaching the time parameter of event diagram calculation:

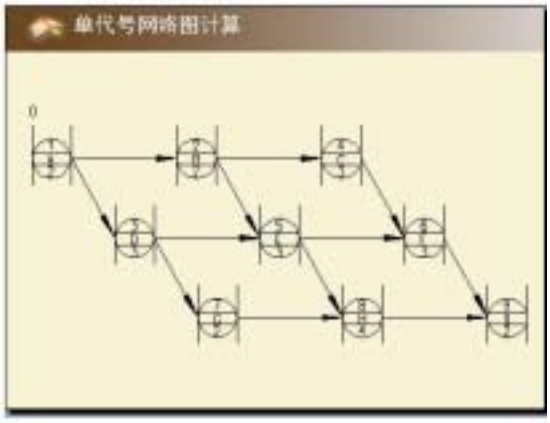

Figure 4: The first step to calculate time parameter of event diagram is to calculate early start date of event A.

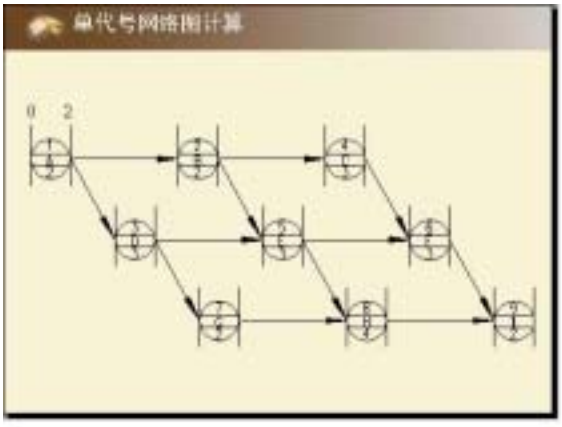

Figure 5: The second step to calculate time parameter of event diagram is to calculate early finish date of event A.

As the saying is, every road leads to Rome. Many computer techniques can satisfy the need of improving effect of classroom teaching. Teachers can use complex software technology in instructing complicated building construction techniques, while they also can use common software accessorial functions in teaching simple calculations.

CONCRETE USAGE IN PRACTICE PHASE

After the semester in which junior students have already learned the building construction in classroom, there is a practice phase, which will last at least one month. During the phase, students will be distributed in different building sites.

In practice at building sites students will not only improve their practice abilities in building construction, but also get benefits to find and adapt a job easily after they are graduated. Quite a few students in civil engineering will go to building construction companies after graduation. In this period, not only building construction companies will inspect the students who want to join them, but also the students can see about working circumstances and personnel relationships of these companies.

There are two ways to arrange the students. One way is that students will be arranged by college teachers. Every teacher is responsible for 10-15 students' practice; include contacting companies and instructing students at building site once to twice a week. The other way is that students are encouraged to find building construction companies themselves, which are willing to accept them. This way is more beneficial to students. Besides finding typical or important projects, which they are interested in, students can also experience the job site working if they like or are fit for.

By the second way, students may be spread all over the inland. It is only by computer technology, which can communicate easily from long distance. The most available method is Internet technology. Several Internet techniques can be used combined during practice phase.

By issuing messages in BBS, teachers will give public information to students, as also students will put their questions to teachers. When a student wants to ask questions privately, he can send his E-mail to his instructing teacher. The technique of MSN will also be used widely at this phase. A teacher can communicate with his students face to face by MSN, because it can provide frequency, video at the same time.

While students are practice in building site, some of them who have electronic products, such as digital camera or vidicon, will take pictures of or video the construction process, which they are interested in. These will be their reports' materials.

The practice time lasting only 4-5 weeks is too short a time to engineering students. At that time, one student can be in one stage of the project construction, for instance, in foundation construction stage, or in superstructure construction stage, or in structural hoisting stage, etc. And every building or even every building site has its own characteristics. Given a conference after practice, students will have a good chance to exchange their experiences. Some selected students will prepare their report by PPT, digital photograph, and digital video

or other multimedia computer technology. By this way, the effect of building site practice will be greatly improved.

To sum up, using of all kinds of computer techniques will advance the practice stage's effect. Computer techniques not only offer a teacher effective methods to instruct his students from long-distance, but also offer students convenient means to exchange their practice experience.

PROBLEMS AND SETTLEMENTS

Using advanced science technology will bring great convenience in teaching building construction course and in practice phase. But its widely application has been limited by some objective factors.

Firstly, most coursewares in classroom education have been accomplished by teachers' own efforts. Both of the quality and quantity cannot achieve a higher level.

Secondly, a lot of social intelligence resource has been wasted because many college and university teachers do the same thing.

Thirdly, the development of computer technology changes quickly. It is difficult for many teachers to master many computer techniques especially to older teacher.

These objective factors limit the using of computer technology widely. The most effective solution to settle all these problems is to establish educational recourse sharing. Each person or each industry has his strong point. The coursewares can be made by an allied company, which unites the technology strength of computer software companies and the specialty knowledge of colleges. This will not only bring advantage to college education, but also bring economic benefit to the allied company. And what's more, this kind of educational resources sharing will bring social progress.

CONCLUSIONS

The building construction course in civil engineering is a practical course which attaches equal importance to its theoretical. The widely using of many kinds of advanced computer software techniques, such as FLASH, PPT, Internet technology,etc. will improve the effection both in classroom teaching and in practice phase.
To establish educational resourse sharing will be beneficial not only to college education, but also to knowledge's popularity and improvement in society.

REFERENCES

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