Construction of Online Learning System of Construction Engineering Management Based on MOOC

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Abstract
With the rapid development of China's economy and science and technology, the overall development of the construction industry shows a good trend, which means that the construction industry will have a very broad development prospect and market in China in the next few years. Therefore, more and more students choose the major of construction engineering management when filling in their major. This major involves many courses, with a wide range of practical contents, which makes it difficult for most people to learn. The online learning system of construction engineering management based on Web technology developed in this paper, applying MOOC network teaching mode, provides a platform for teachers of famous schools to display their teaching ability and share teaching resources. The platform also provides students with an open, free and high-quality online learning system, which allows cash-strapped learners to obtain the richest teaching resources at the lowest cost, so as to improve their professional knowledge level, improve their learning enthusiasm and broaden their horizons.

Keywords: *MOOC; construction engineering management; Web technology; online learning system*

1 INTRODUCTION

MOOC is a new online course model which is free and open to the whole society and appears in the field of education in recent years. It is a cross-regional and cross-university learning method [2]. With the continuous progress of science and technology, online teaching form based on MOOC course has become a popular new trend, and has gradually become one of the important ways for college students to expand their knowledge. Nowadays, with the arrival of the 5G era, there is an increasing demand for fragmented learning anytime and anywhere, which makes MOOC teaching mode more widely concerned. MOOC, an excellent online teaching mode, makes people's desire for lifelong learning simpler and more feasible. Many students regard this course model as a formal supplement to offline teaching. This form is to convert the high-quality courses of famous teachers in real life into videos and upload them to the network system. There is no restriction on the number of class members and students, so that those who have no chance to enter a famous school for research can also enjoy the right to study the courses of this school. In MOOC mode, learners can choose their own learning content, adjust their learning progress, repeatedly watch the content that is not easy to understand or slow down the playback speed, and skip the already mastered part of the video. The lecturers of the courses are all excellent teachers from famous universities, and the content of the lectures pays more attention to the connotation. Their perspectives, thinking and explanation methods of the courses can be displayed through the online system. The biggest difference between MOOC and open classes in famous schools in the past is that it is based on the needs and characteristics of online learners, and the planning and production of teaching videos are specially prepared for giving learners a better experience. The duration of a traditional college course is between 1.5 hours and 2 hours, and there is basically no pause in the middle of the lecture, which makes it difficult for students to have the patience to concentrate on the whole course. MOOC, on the other hand, has a short video course. Each knowledge point can be divided into one lesson, and the duration can be controlled within 20 minutes, so that students can make full use of the fragmented time to study. After learning a new knowledge point, students can still have enough time to understand and digest.

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As the state has strict regulations on the engineering projects that large, medium and small enterprises with various qualifications can undertake and develop, and the competition in the construction market is becoming increasingly fierce, most enterprises need front-line engineering and technical personnel who know design, construction and management to join the enterprises to improve their professionalism and management level [5]. In order to meet the demand of the society for high-level construction engineering talents, colleges and universities have set up the major of construction engineering management. The major covers a wide range of knowledge and technology, and most of the courses are partial to science and engineering. It also requires a lot of outdoor practice, which makes it difficult for students to learn and most of the knowledge points are not easy to understand. Students often have not digested and absorbed the knowledge they have learned well, and new knowledge is instilled in them, resulting in students not being able to really understand and master professional knowledge. The author thinks that the online learning system of construction engineering management based on Web technology is developed on the basis of MOOC teaching mode. With the convenience of the network, it provides a free, open and high-quality online learning system for students of this major, so that they can learn better knowledge without spending high fees, so that they can use their spare time to consolidate their professional knowledge and broaden their horizons. Teachers of famous schools can upload their own video courses to the learning system. The video courses on this platform absorb the advantages of MOOC mode, and the duration of courses is controlled at about 10 minutes. Each course can be regarded as an independent unit, which can be integrated into a closed-loop complete course, so that learners can better grasp the key points of each class, and they can selectively study independently according to their own situation [7]. The difference between the process of teachers' assignment of tasks and phased tests and the traditional classroom is that this system adopts the system of student group mutual evaluation, which aims to reduce the workload of teachers in marking the task documents and papers submitted by students, and at the same time provide teachers with more valuable reference information.

2 TECHNICAL OVERVIEW

2.1 Ajax technology

Ajax (Asynchronous JavaScript and XML) is a kind of asynchronous JavaScript and XML technology which is integrated by many front-end technologies such as JavaScript, XML, DOM, CSS, XHTML, etc. It is responsible for the client technology of asynchronous interaction with the server. The user's operation request uses Ajax technology to realize the communication with the Web server. Compared with the traditional Web working mode, it has many advantages, such as reducing the redundant requests from the client to the server, saving the cost of renting bandwidth, etc. Therefore, this paper chooses Ajax technology to carry out the front-end asynchronous interaction. As shown in Figure 1, it is the code to realize Ajax with JQuery. A $.ajax function is defined and packaged in advance, which is convenient for subsequent use.

```
$.ajax({
  type: "POST", //Send by POST or GET
  url: "ajax.php", //Address sent
  dataType: "json", //Format of transmitted data
  data: {"username": "zwkkkk1","password": 123456}, //Transmitted data
  //Successful callback function
  success: function(msg) {
    console.log(msg)
  },
  //Failed callback function
  error: function() {
    console.log("error")
  }
```

Figure 1: JQuery implements Ajax

2.2 PHP language

As a dynamic general open source scripting language, PHP is basically compatible with all the current mainstream operating systems and database management systems. The file generated by PHP can only run normally if it is placed in the www folder directory, and its file extension name is. php. The code written by PHP should be placed in <? php……? > or < script language = "PHP" > ... </script > to be compiled into a PHP script. The end of a line of code in PHP must be marked with a semicolon. As one of the separators, ";"in PHP language used to distinguish code instructions, it can be regarded as the terminator of code instructions. PHP language supports default types, and the definition of types can be omitted when unnecessary. Text, HTML and JavaScript codes can be embedded in PHP files, which greatly improves the efficiency of code writing. PHP contains two instruction codes, echo and print, which can output text to the browser. In this paper, PHP is chosen as the development language of the system server, because it is open source and free, and can run efficiently on the server side. This time, the latest version of PHP7 is used, and its running performance is 2-3 times higher than that of PHP 5.6. PHP can connect and operate databases, and MySQL database with PHP is one of the most popular development methods. The interaction process between PHP, Web browser and MySQL is shown in Figure 2.

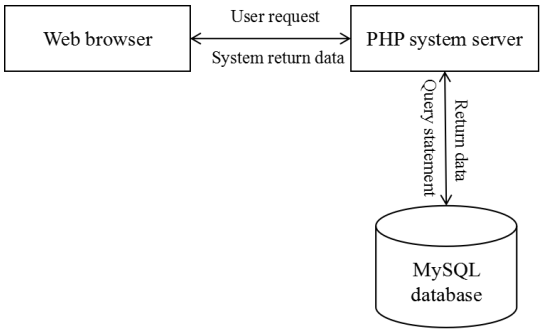

Figure 2: PHP interaction process

2.3 *Laravel framework*

PHP language contains many open source and free development frameworks. The reason why Laravel framework is adopted in this paper is that Laravel version 5.1 supports PHP7. Laravel framework integrates many excellent new features of PHP. Laravel not only supports user authentication and licensing, but its package system is modular, and all of them have their own package library, which provides a variety of ways to connect related databases, and provides tools for applications to deploy and maintain. As a PHP Web development framework, Laravel has the advantages of conciseness and elegance. Every line of code in the system written and developed with it is concise and orderly. Laravel framework is developed on the basis of MVC design framework, and its architecture model is designed by absorbing the advantages of MVC. Laravel adopts hierarchical design, which puts together class libraries with the same functions. Laravel framework is a component-based framework. Classes are the basic unit, and different classes constitute services, and then a component is composed of multiple services. Components provide various services, and the combination is a complete project. Figure 3 shows a controller written in Laravel framework to verify whether users log in.

```
class UserController extends Controller
public functi on login(Request $request){
if ($request->isMethod(" post")) {
$input = $request->al1(;
dump ($input);
}else {
echo 1123;
return view(" admin/user /login");
}
```

Figure 3: Login verification

2.4 *MySQL database*

MySQL database is a classic relational database. Compared with other types of databases, it is characterized by storing data in different data tables by categories, and then loading the classified data tables into different databases. The advantage of this design is that it increases the speed of database reading, and improves its flexibility and manageability. Generally, SQL structured query statements are used to access, operate and manage MySQL databases. Writing commands in MySQL database is case-insensitive, so it is easy to operate. In this paper, MySQL is chosen as the bottom support of system data because it has strong compatibility and can be used well with PHP language. As shown in Table 1, it is a simple database organization table, and an account registry is created.

Table 1: Account number table

ACCOUNT table			
Field	Type	Length	Remarks
ID	INT	Default	Principal linkage
USERNAME	CHAR	25	User name
PASSWORD	CHAR	25	Password
ROLE	TINYINT	3	User role

2.5 *Development environment*

According to the above-mentioned development language and development framework, a suitable development environment is configured for its installation. The development environments used in this paper are all installed under the Windows operating system. First, configure the environment for Ajax: first, download and install node, create a new folder named 111, right-click in the folder and select "Open Powershell window (s) here", and enter npm init --yes and npm install express --save in cmd. After the operation is completed, there will be package-lock.json, package.json file and node_modules folder in folder 111. Then, deploy the environment for PHP: go to official website and download the 32-bit installation package. The installation storage path is D:\Server\, download, unzip and install the Apache2.4.9 server, and configure the environment variables for it. Open the httpd.conf file, change the root path of Apache to D:/Server/Apache24, and add "index.php" to the default open page type. Download 64-bit php-7.0.0-Win32-VC14, put it in the D:\Server\PHP7 folder, copy the PHP.ini-development and rename it php.ini. Open httpd.conf under Apache24/conf and add # php7supportloadmodule php7 _ module "d: \ server \ 7/php7apache2 _ 24.d11 "AddHandler Application/x-httpd-php.php # configure the path to php.iniphpinidir" c:/myserver/php7 "is used to support PHP. Secondly, configure the environment for Laravel framework: first download and install composer, install the image, then download and install Laravel framework with composer.

After the installation is completed, visit server.php in the project directory. If you see the welcome interface, the installation is successful. Finally, build the MySQL database environment, download the MySQL database software package in official website, download and install it, and configure the environment variables for it: click Computer-> Properties-> Advanced Environment Configuration-> Environment Variables-> System Variables ->path, and click path to add D:\mysql-5.7.23-win32\bin; (Note that the English semicolon here cannot be omitted). The above environment deployment and installation ensure the feasibility of the online learning system of construction engineering management in this paper.

3 REQUIREMENT ANALYSIS

3.1 System requirements analysis

According to the actual situation, this paper divides the demand into two parts: teachers and students. In this system, teachers can not only edit and upload video courseware, but also edit and upload course introduction. The duration of uploaded video should not exceed ten minutes, otherwise it will fail to upload. In the actual classroom teaching process of construction engineering management major, in order to cultivate students' sense of teamwork and hands-on ability, teachers mostly assign homework in the form of group collaboration, which is submitted to teachers after the students collaborate with each other [1]. In this system, teachers are given the right to view students' information, which is convenient for teachers to manage in groups. In order to reduce the amount of teachers' review, a group mutual evaluation system is implemented. When a teacher releases a task, set some indicators and rules for this task in advance according to the divided groups in advance, and then let the groups score each other according to these indicators. Teachers set test questions according to the course content, and the review of test questions is also completed by each group. Teachers only need to send the test answers to the group leaders and check the results uploaded by the group leaders to understand the students' learning situation [4]. The information related to this system video course has read-only permission for students, so they can view the details of the course, choose their favorite courses, watch and study them, and view the courseware needed to download the course. After the teacher publishes the task, he can view the course task, download the task file, and view the assignments of other groups. The group leader also has the right to upload the group grading results. In the discussion group, members of each group rate other groups [3], the group leader rates his own group members, and the group leaders rate each other. Through the completion of the test questions issued by the teacher, I will test my recent study in stages and test my own learning situation.

3.2 Global design

The online learning system of construction engineering management based on MOOC in this paper is designed on the basis of Web program development and MVC design pattern. PHP language and Laravel framework are selected for the development of the back-end server, and Ajax technology is used to realize the asynchronous interaction between the front-end and the back-end. Ajax can modify individual web pages without loading the whole system web pages. The author has saved a lot of tedious processes by integrating this technology into the front-end page development. Laravel framework is based on MVC design architecture. When a user wants to interact with an application written by laravel, the browser sends a request to the Web server after receiving the user's instruction, and the Web server responds and sends it to Laravel's router. The laravel routing engine accepts the request and finds the corresponding controller class method according to the configuration in the request, and then the controller class accepts and processes it. In some requests, the controller will immediately render a view template, convert it into an HTML page and send it to the browser for presentation. In the dynamic Website system of this paper, laravel's controller interacts with view, and is responsible for transferring information to MySQL database. After calling the model, the controller returns the required image and presents a complete web page to the user's browser. Laravel simplifies the process of accessing the database, and realizes the operation and connection of data models and data tables in the system by converting data tables in the database into simple and easy-to-operate PHP objects. It can also describe the relationship between different data models in the system.

4 FUNCTION REALIZATION

As shown in Figure 4, the functional modules of this system are divided into teaching module and learning module. Teachers enter the teaching module after authentication, and learners enter the learning module after registration and login.

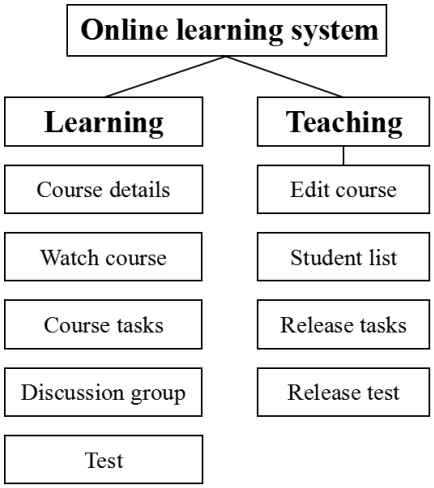

Figure 4: Specific function realization

4.1 Teaching module

Edit course: Teachers have the right to edit and modify the course information. As the disciplines covered by the major of architectural engineering management are numerous and complex, teachers can give a brief introduction to each section, each chapter and even the whole course, such as personal information of teachers, brief introduction of course contents, etc. [9] Edit and upload courseware. Teaching videos can be edited and cut according to the templates provided by the system to ensure that the duration of the videos does not exceed the scope stipulated by the system. Teachers can also intersperse a few small questions in the videos for students to answer according to the course content.

Student list: Teachers can view the information of students who choose their own courses, divide them into groups, select the group leader according to their learning situation and activity, and give permission to upload files and manage discussion groups to help them manage their students.

Release tasks: Summarize some course tasks according to what you have learned, such as small tasks in engineering survey and architectural engineering drawing. Publish the tasks and related documents to the system for students to check and download. After the students finish and conduct group mutual evaluation [6], check the mutual evaluation results uploaded by the group leader, and rate and comment on the results.

Release test: According to the recent edited and staged test questions, for example, the engineering cost management major can make some choices and fill-in-the-blank questions related to the final accounts, and upload the corresponding answers after the students submit them, so that the groups can read each other's papers, and check the student scores uploaded by the group leader to learn about the students' learning situation.

4.2 Learning module

Course details: You can click the video details to view the video introduction, teacher information, course chapters and other information.

Watch course: Students choose courses they are interested in for further study, and video lessons can be fast-forward or slow-forward according to their own situation. In the process of watching the course, there will be small pop-up problems. Students can only watch the video after answering and checking the problem analysis. After class, students can also download and read the courseware uploaded by the teacher in advance, so as to better consolidate what they have learned.

Course tasks: Students can check the tasks issued by teachers and download task attachments. After completion, they can upload the submitted task text and attachments. They can also check the other group curriculum tasks and attachments that their group is responsible for grading.

Discussion group: After entering the discussion group, the group leader will conduct group mutual evaluation on the tasks and test questions according to the rules and answers issued by the teacher. The group leader will evaluate his own team members at the same time [10], and the team members will send the evaluation results to the discussion group. After analyzing and sorting, the team leader will upload the results to the task module and the test module respectively, and after the teacher reviews and reviews, the results will be fed back to his own team members for centralized discussion and analysis.

Test: After the teacher release the test questions, he answers them, submits them after completion, and checks and marks the papers of other group members in charge of his group. Finally, the group leader integrates the marking results of his group members and uploads them to the test module, and then forwards the results to the discussion group after the teacher reviews them.

5 CONCLUSIONS

The online learning system of construction engineering management based on MOOC designed and developed in this paper provides a free and open high-quality online "university" for students. Teachers from famous universities can upload their own video courses to the system and share their precious teaching methods with the public through the platform to realize resource sharing [8]. Students use their spare time to enter systematic learning to help them better absorb and understand what they have learned in class. And follow the excellent famous teachers to learn, so that they have a deeper understanding of the major of construction engineering management, improve their interest in course learning, broaden their horizons, and have a better plan for their future study and employment direction.

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