



Development of Online Teaching System of Computer Application Basic Course Under the Background of “Internet Plus”

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Abstract. In order to strengthen the knowledge literacy and practical skills of computer majors in colleges and universities, the author of this paper has developed an online teaching system of computer application basic courses based on Web technology, conforming to the teaching reform situation of “Internet + education”. The system adopts Java language for programming, introduces SpringMVC framework to complete the whole process construction, and MySQL database is selected for data storage and management, thus constructing an online learning platform with simple operation but powerful functions. This system can make a beneficial supplement to traditional classroom teaching, improve the actual effect of teaching, help students better master the knowledge and skills covered by this course, and provide new ideas and more possibilities for the reform of computer application basic course.

Keywords: Internet plus education · Computer application basic course · Online learning · SpringMVC · Java

1 Introduction

As the world enters the information age, the rapid development of computer technology makes people highly dependent on computers for their study, work and life, and puts forward higher requirements for the development of computer technology. The development of technology needs the support of talents, and colleges and universities are an important way to cultivate talents. The computer application basic course plays a very important role in universities all over the country. It is not only a required course for students majoring in computer-related theories, but also a general course for students majoring in other majors, making full preparations for their future work and life in the information society.

However, at present, the teaching of computer application basic courses in colleges and universities still adopts the traditional classroom teaching mode, which is still teacher-centered, and students’ autonomy is not high. The teaching form is inflexible, there is a lack of interaction between teachers and students, and students’ interest in learning is not high. Lack of innovation in practice makes it difficult to really train students’ practical ability. The course examination is biased towards formalism, and it is

difficult to reflect the students' learning situation. To solve the above problems, colleges and universities have carried out teaching reforms for this course, among which "online teaching" is a very important reform direction. However, this reform is still in the trial and exploration stage, and it still needs the joint exploration and efforts of educators at all levels.

To sum up, the author thinks that we should give full play to the advantages of "Internet + education", develop an online teaching system for computer application basic course, fully integrate network resources, set up two login roles for students and teachers, and realize the vivid interaction between teachers and students. While doing a good job in knowledge dissemination, it can strengthen the practical effect of practice, enrich the assessment methods, and maximize the practical significance of assessment.

2 Key Technologies

2.1 Web

Web is a distributed graphic information system based on the Internet, which transforms the information in the Internet into a visual and readable interface. All technologies that support Web operation are collectively referred to as Web technologies. The five elements of Web technology are: identification mechanism (such as URL), transmission protocol (such as HTTP and HTTPS), data format (such as HTML, XML, JSON), Web browser and Web server. These elements are divided into two categories according to their functional attributes, namely client-side technology and server-side technology. The main task of the Web client is to display the text, data, graphics and other information that users need. The initial function of the Web server is simply to respond to the HTTP request sent by the client, and return the HTML file stored in the server to the client.

2.2 Java

Java is a universal, class-based and object-oriented programming language. As a typical example of the successful application of object-oriented technology, Java language can greatly help developers with its obvious application advantages of simplicity, robustness, security, cross-platform, portability and multi-threading, thus expanding its application scope and achieving its broad development prospects. As for Java platform, its essence is the running environment of all kinds of software or applications written by Java language, and it is also the integrated development platform of Java language [1]. As shown in Table 1, it is an analysis of the characteristics of three Java systems.

2.3 SpringMVC Framework

SpringMVC is a design pattern based on designing interface applications. It decouples the business logic from the interface by separating the model, view and the role of the controller in the application, which can well separate the business logic from the data display. The View represents the interface presentation layer, the Controller represents the control flow, and the Model represents that in general, the model is responsible

Table 1. Analysis of the characteristics of Java SE, Java EE and Java ME

Syst em	Edition	Main appli- cation	Class containing	Relation schema
Java SE	Standard version	PC terminal software	Database connection, interface definition, input/output, network programming	
Java EE	Enterprise version	PC web page	It includes the classes in J2SE, as well as the classes used to develop enterprise applications, such as EJB, servlet, JSP, XML and transaction control	
Java ME	Micro version	Mobile terminal APP	Include some classes in J2SE	

for encapsulating the application data and presenting it in the view layer. Views only show these data, and do not contain any business logic. The controller is responsible for receiving requests from users and calling background services (manager or dao) [2].

2.4 Development Process

In view of the completion of the construction of physical education class Cheng Sizheng online teaching platform under the framework of SpringMVC, the overall open environment configuration choices are as follows: Windows 10 is the operating system for system development, Tomcat 8.0 is selected on the Web server, which has the advantages of small size, stable performance and free use, making it the first choice for current Web application development. Java is the development language, and its development kit (JDK) version is 1.8.0_91, and JDK is used as the The SpringMVC framework needs to be downloaded from Apring official website, and the version is SpringMVC5.3.20. The workflow of SpringMVC is shown in Fig. 1. The underlying development tool is Eclipse IDE 20210r, the script language is JSP and Sverlet, and the database server is MySQL5.8. The selection of some versions depends on the compatibility and stability of system functions. The above configuration sequence is Tomcat 8.0 server, Java language, SpringMVC framework and MySQL database. After the development environment is configured, the system functions are designed concretely. Finally, the whole project is packaged and published to the server for the client to use.

3 Function Implementation

3.1 Student Side

Students click to enter the online teaching system of computer application basic courses, and they can see two login identities: student platform and teacher platform. Click to enter the student platform to register and log in, and after logging in, they will see three modules: autonomous learning, self-evaluation and self-test and communication space.

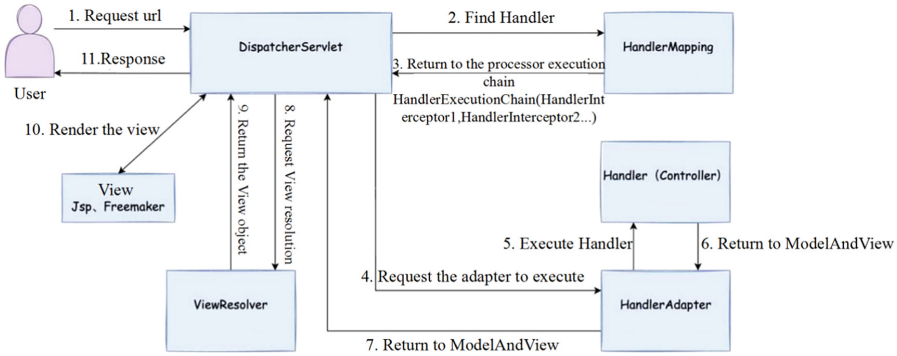


Fig. 1. SpringMVC Workflow

In the “autonomous learning” module, students will see two options: “preview before class” and “review after class”. In the “preview before class”, there are high-quality online courses uploaded by teachers, such as the national excellent course “computer application basic” of Shangqiu Vocational and Technical College, as well as micro-course videos recorded by teachers themselves, so as to conduct interesting and guided learning of classroom content. Students can play barrage for interaction, or discuss the course content in the comment area. The technology used in micro-lesson video uploading is Springboot, and some codes are shown in Fig. 2 [3]. In the “after-class review”, students can make an appointment for live broadcast and receive the countdown notice of the start of live broadcast. In the live class, teachers will summarize the knowledge in the class in stages, such as dividing the knowledge system according to Word, Excel, PowerPoint, to help students form a complete and clear knowledge structure from scattered knowledge. Students can share the screen and ask questions in the actual computer operation. Teachers can give hands-on guidance to help students consolidate their basic knowledge and improve their hands-on ability.

In the “self-evaluation and self-test” module, students can complete the relevant homework and stage tests assigned by teachers. In homework, it is necessary to incorporate situational dialogues or form similar games in scenes, strengthen the integration of students’ theoretical knowledge and technical skills, and improve students’ enthusiasm and initiative for learning. In the test, students’ hands-on ability is more tested. Students need to practice on the computer and submit real works, such as word processing files, table processing files and presentation processing files. The works are also open to students in the class. Students can vote on the works and select the best works. The system will update the changing votes in real time according to the voting results. The technology used in ranking and ranking update is JavaScript, and some codes are shown in Fig. 3 [4].

In the “Communication Space” module, students can have interactive communication, which is similar to an open forum, and the content is open to all users. Students can share the problems in computer application basic learning and practice, and lay a solid foundation in communication and cooperation. Students can also communicate with teachers, ask questions to teachers, and have free discussions on the questions

```

//Call the query method, pass the id from the front end and query the corresponding
video information.
VideoUpload videoPathList = videoUploadMapper.SelectVideoId(videoId);
//Separate the video path information from the video information and save it.
String videoPathUrl=videoPathList.getVideoUrl();
//Save video disk path
Path filePath = Paths.get(videoPathUrl);
//Files.exists: used to test the existence of path files.
if (Files.exists(filePath)) {
    //Get the type of video, such as MP4.
    String mimeType = Files.probeContentType(filePath);
    if (StringUtil.hasText(mimeType)) {
        //Determine the type, and process the corresponding data according to
different types of files.
        response.setContentType(mimeType);
    }
    //Convert video stream part
    request.setAttribute(NonStaticResourceHttpRequestHandler.ATTR_FILE,
filePath);
    nonStaticResourceHttpRequestHandler.handleRequest(request, response);
} else {
    response.setStatus(HttpServletResponse.SC_NOT_FOUND);
    response.setCharacterEncoding(StandardCharsets.UTF_8.toString());
}
}
}

```

Fig. 2. Video upload code of micro-lesson (part)

raised by teachers. The questions are mostly aimed at solving practical problems and thinking deeply about computer-related problems, such as “How do you think about PPT template application?” “How to ensure the security of computer information”. Effective feedback on teaching activities can be formed through two-way communication, which helps teachers to find problems in learning in time.

3.2 Teacher Side

Click to enter the online teaching system of computer application basic courses, and you can see two login identities: student platform and teacher platform. Click to enter the teacher platform for registration and login, and teacher will see three modules: course management, evaluation management and communication space.

In the “course management” module, teachers can manage courses, click “preview before class” to list the courses offered by this teacher, manage and edit courses in the list, upload teaching videos, check the participants of courses, modify the basic information of courses, publish course notices and so on. Click “after-class review”, and the teacher can release the live broadcast notice, make an appointment and initiate the live broadcast class. During the live class, teachers can manage students’ microphones, cameras and other equipment, and check students’ mastery of classroom knowledge.

```

        if(childs[i].nodeName == "BUTTON"){ //Click the button to vote
            var oButton = childs[i];
        }
        if(childs[i].nodeName == "P"){ //Voting result update
            var oP = childs[i];
            var oSpan = oP.getElementsByTagName("span")[0];
        }
    }
    if(oButton != null){
        oButton.onclick = function(){ //Event binding
            var num = oSpan.innerHTML; //Get the votes
            oSpan.innerHTML = (++num); //Vote update
            // At this time, in general, we may need to send this number of
            votes num to the server for storage, and it is also synchronized with the num in the server when updating.
            this.setAttribute("disabled","true"); // You can only vote once
            alert("Successful vote, thank you for your support");
        };
    }
}
})(item); // Enter each person item
}
};
</script>

```

Fig. 3. Part code for students' works vote update

In the “evaluation management” module, teachers can edit the assessment questions online and set the form of homework submission, including text, pictures, videos, etc. Teachers publish exam information to inform students. After students submit their works, teachers evaluate and grade them, and can manage students' comments.

In the “Communication Space” module, teachers have administrator rights, and can manage the posts, replies and users of this section, such as setting top, specifying essence, viewing. In the posting page, CKEditor plug-in is used, and users can operate the font, font size, word color, etc., and also customize the expression pack, which enriches students' presentation methods. The code is shown in Fig. 4 [5].

```
//View posts
@RequestMapping(value = "postContent-{postld}")
public String intoPost(@PathVariable int postld, HttpServletRequest request) {
    System.out.println(postld);
    Post post = postService.listPostContent(postld);
    List<Reply> replies = replyService.listReplyByPostld(postld);
    if (post == null){
        return "/error";
    }
    //Add reply information if there is a reply to the post
    if (replies != null) {
        request.setAttribute("replies", replies);
    }

    request.setAttribute("post", post);
    return "post/postContent";
}
```

Fig. 4. Teacher reply to student post part code

4 Conclusions

The online teaching system of computer application basic courses can complement the traditional teaching mode, and it has made a useful attempt in teaching mode, teaching resources, teaching means and evaluation system. This system can improve students' interest in computer application basic courses, consolidate classroom knowledge, provide more opportunities for improving students' practical ability, enrich the examination forms, make the examination more aimed at students' ability to solve practical problems, help students become professionals with excellent theoretical knowledge and practical ability, and provide more directions and higher efficiency for college curriculum reform. In the future research, we will continue to deepen the reform of the computer application basic courses, maximize the role of online teaching, and contribute to cultivating more and better students.

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