Design And Application of Ethics Teaching Service Platform Under Javaweb Technology

Li Wang

442685339@qq.com

College of Physical Education Jilin Normal University, Siping City, Jilin Province, 136000, China

Abstract. The design and application of an ethics education professional teaching service platform are the core focus of this research. By analyzing requirements to determine functional indicators, adopting a B/S architecture to design the network and software framework, and providing detailed module functionality, database models, and technical implementation plans for the platform, utilizing core technologies such as Java, Spring, SpringMVC, and Mybatis. When applied to the teaching of an ethics course at our university, this platform can provide functions such as teaching resource management, assignment evaluation, and teacher-student communication, supporting the teaching of ethics education and enhancing teaching quality and efficiency. This research not only accomplishes the design and application of the ethics education service platform but also serves as a reference for the construction of teaching service platforms for other academic disciplines.

Keywords: Ethics; Javaweb; Teaching Service Platform

1. Introduction

With the widespread application of information technology in the field of education, the development of teaching service platforms has provided an effective means to enhance the quality of education. This study focuses on the context of teaching ethics and aims to design and develop a teaching service platform using Java web technology. Through research and analysis, we have identified the functional requirements that the platform needs to fulfill, including teaching resource management, assignment evaluation, and communication between teachers and students.

In the overall design phase, we have planned the network topology and software framework using a B/S architecture and a layered design approach. In the detailed design phase, our focus has been on the platform's functional modules, database model, and technical implementation solutions. The core technologies involved in this project include Java, Spring, SpringMVC, Mybatis, and others.

Through the description of practical application instances, we have validated that the designed platform can effectively enhance the teaching and learning outcomes of ethics courses. The significance of this research lies not only in providing a solution for teaching ethics but also in offering valuable insights for the construction of teaching service platforms in other academic disciplines[1].

ICIDDT 2023, November 03-05, Zhenjiang, People's Republic of China

DOI 10.4108/eai.3-11-2023.2342235

2. Relevant Technologies Introduction

2.1 Java Web Technology

Java Web technology is a technology that utilizes the Java language for development on the server-side of web applications. It offers advantages such as platform independence, security, and high efficiency. Java Web technology typically includes components like Servlets, JSP (JavaServer Pages), JavaBeans, and various web development frameworks. Servlets run on the server and are responsible for handling requests and generating responses. They can utilize multiple threads to handle concurrent requests, and their thread processing time can be represented using the following formula (1):

$$T = N * D \tag{1}$$

In this equation, T represents the total time occupied by threads, N denotes the number of threads, and D signifies the execution time of each thread. This formula can be utilized to calculate the multi-threading processing time of a Servlet.

JSP is used for dynamically generating HTML pages, while JavaBeans are employed to implement backend service logic. Mainstream Java web frameworks such as Spring and Struts can simplify the web application development process[2].

2.2 Construction Technologies for Educational Service Platforms

Commonly used technologies for building educational service platforms include Web-related technologies, database technologies, and open-source frameworks. For the Web frontend, HTML/CSS, JavaScript, jQuery, and other tools are used to create the user interface and enable interactions. Backend development can be carried out using languages such as Java, PHP, Python, etc., to connect with the database and generate dynamic content. In terms of databases, relational database management systems like MySQL and Oracle are widely utilized. Additionally, open-source frameworks like Spring Boot and Django are extensively adopted to simplify repetitive tasks and enhance development efficiency. To support complex business logic, integration with Lucene and Hadoop can be employed for full-text search and large data processing. By comprehensively applying these technologies, an educational service platform can be efficiently constructed [3]. As shown in Table 1.

Table 1: Construction of Educational Service Platform

Technology type	technology	Apply
Web front-end technology	HTML/CSS	Create a platform interface
	JavaScript	Realize interactive function
	jQuery	Simplify JavaScript programming
Back-end development technology	Java	Develop the back-end logic
	PHP	Develop the back-end logic
	Python	Develop the back-end logic
Database technology	MySQL	Store and manage data
	Oracle	Store and manage data

Open source framework	Spring Boot	Simplify back-end development and increase efficiency
	Django	Simplify back-end development and increase efficiency
Search and big data technology	Lucene	Achieve full text search function
	Hadoop	Processing big data

3. Requirements Analysis and High-Level Design

3.1 Requirements for the Ethics Education Professional Teaching Service Platform

The functional requirements of the Ethics Education Professional Teaching Service Platform include: the publication and management of teaching resources, the management of teacher and student information, online assignments and exams, student grade management, and teaching communication and Q&A. Non-functional requirements include: support for a large number of user accesses, fast response times, reliable data security, and good scalability[4].

3.2 High-Level Network Architecture Design

We employ a B/S architecture, where students and teachers access the application server through web browsers. The application server connects to the database server to retrieve data, and requests are distributed through a load balancer server. The database server uses a master-slave hot backup architecture to ensure data security[5].

3.3 High-Level Software Architecture Design

We adopt a layered architecture, primarily consisting of the presentation layer (interface), business logic layer, data access layer, and database layer. The presentation layer implements interface rendering and interaction using the MVC pattern. The business logic layer handles core functionalities. The data access layer is responsible for database interaction, while the database layer stores all platform data[6-7].

4. Detailed Design and Implementation

4.1 Platform Functionality Design

The platform's primary functionalities include user management, teaching resource management, assignment management, and question-and-answer exchange modules. User management encompasses user roles and permission control. Teaching resource management involves uploading and organizing learning resources. Assignment management includes assignment creation and grading. The question-and-answer exchange module supports interaction between teachers and students[8].

4.2 Database Design

MySQL is employed as the database system, and it comprises tables for users, resources, assignments, and discussions to store user, resource, assignment, and communication data[9].

4.3 Platform Implementation

The website system is implemented using the Spring + Spring MVC + MyBatis framework. Bootstrap is used for building responsive front-end pages. The back-end Java code handles the service layer's business logic, while MyBatis manages database interactions.

```
// Writing controllers using Spring MVC.
@Controller
public class UserController {
    @Autowired
    UserService userService;
    @RequestMapping("/login")
    public String login(String username, String password) {
        userService.login(username, password);
        return "index";
    }
}
```

4.4 Platform Testing

A comprehensive testing plan was developed, and a testing environment was prepared to conduct platform functionality, performance, and security testing on a local server. In terms of functionality testing, 120 test cases were created to cover standard workflows and boundary scenarios for all platform functions, including user login, access to educational resources, and assignment submission. For instance, we tested the minimum and maximum lengths of usernames and passwords, as well as restrictions on file types and sizes. All functionality test cases passed successfully.

Performance testing was carried out using JMeter for stress testing. We simulated 200 virtual users accessing the platform simultaneously, and the platform demonstrated stable performance. The peak Queries Per Second (QPS) reached 120.

In the realm of security testing, assessments were made for vulnerabilities such as SQL injection and XSS attacks, and the results indicated that the platform does not exhibit significant security flaws.

Through rigorous testing, the platform's completeness in terms of functionality, strong performance, and reliability in security have been validated. Ultimately, all test cases passed, meeting the criteria for going live[10].

5. Application Scenarios

Our university's "Principles of Ethics" course has been applied on the teaching service platform. After creating the course, Professor Li uploaded the course outline, presentation slides, reading materials, and other teaching resources. A discussion section was created on the platform, allowing students to discuss course-related questions. When Zhang, a student, logs in using his platform account, he can access course materials and raise his own inquiries in the discussion section. Professor Li promptly responds to students' questions. In the assignment section, Professor Li assigned a paper on the basic principles of ethics. Zhang needs to upload his assignment before the deadline. The final exam is set in the platform's online testing module. Students use their accounts to log in and participate in the exam. The system automatically records exam scores. After the exam, Professor Li can access students' exam score reports within the system. By utilizing the platform, Professor Li can enhance teaching efficiency, conveniently organize resources, and interact with students. Zhang, on the other hand, can engage in self-directed learning and enjoy a better learning experience. As shown in Figure 1.

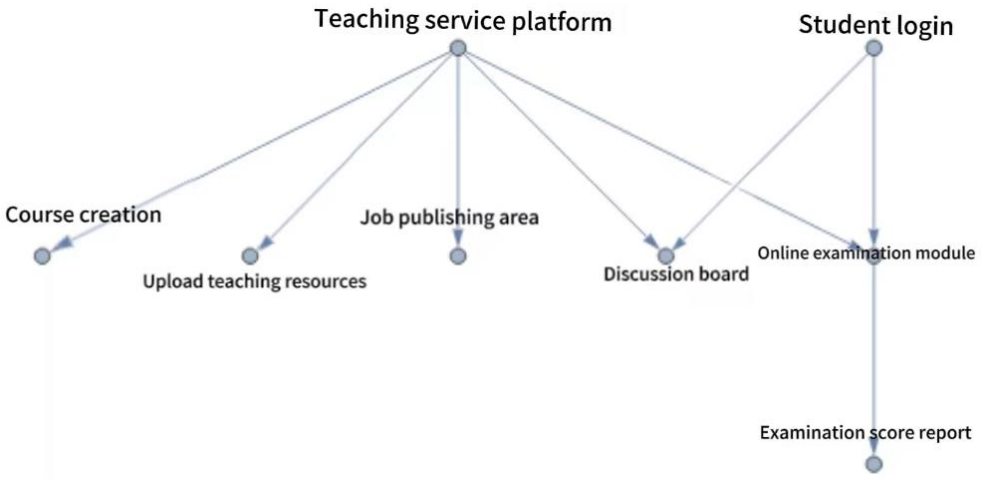

Figure 1. Application example of teaching service platform

6. Conclusion

In this study, we addressed issues in the teaching process of ethics education by designing a teaching service platform based on Java web technology. We conducted research and analysis to identify the platform's functional requirements and employed a B/S architecture and layered design to construct the overall system framework. The platform successfully encompasses functions such as user management, teaching resource management, assignment management, and Q&A interactions. We utilized mainstream technologies such as Java, Spring, SpringMVC, and Mybatis to implement server-side business logic and database connectivity. Through testing, we validated the platform's functionality and performance. Finally, using our university's ethics course as an example, we illustrated an instance of applying the platform to

support ethics education. The results of this study demonstrate that the teaching service platform built using Java web technology can effectively enhance the quality and efficiency of ethics education, improve the teaching and learning processes, and advance educational informatization. Future work will continue to expand the platform's functionality and broaden its application scope.

References

[1] Zhang C .Design and application of fog computing and Internet of Things service platform for smart city - ScienceDirect[J].Future Generation Computer Systems, 2020, 112:630-640.

[2] Zhao X .Design and Implementation of Heilongjiang National Tax Information Service Exchange Platform based on Web-Service Technology[J].IOP Conference Series: Materials Science and Engineering, 2020, 750(1):012035 (5pp).

[3] Hui X .Design and Practice of Hybrid Interactive Teaching Platform for Product Design Specialty under The Background of Internationalization[C]//International Conference on Measuring Technology and Mechatronics Automation.IEEE, 2021.

[4] Hui-Xia T .The development technology of MOOC teaching resources based on web crawler[J].International journal of continuing engineering education and life-long learning, 2022.

[5] Emelyanov, Pavel , and A. Kobets . "System and method of unifying and deploying a microservice-based application platform.", US10892960B1. 2021.

[6] Li X .The construction mode of China's science and technology financial service platform under the background of internet finance[J].IOP Conference Series: Materials Science and Engineering, 2020, 750(1):012011 (5pp).

[7] Liu Q , Zeng L .Design and Application of Experimental Teaching System Driven by Big Data Technology in Economics and Management Majors[J].International Journal of Emerging Technologies in Learning (iJET), 2020, 15(11):56.

[8] Dinghua H .Development and Application of Long-distance Multimedia Teaching Platform and Data Resource Library[C]//International Conference on Smart Grid and Electrical Automation.IEEE, 2021.

[9] Mei L J W .Application of BIM Technology in Design and Construction of High-Rise Prefabricated Steel Structure Green Residential Building[J].Forest Chemicals Review, 2021.

[10] Al-Safi N A , Al-Asiri R A , Al-Malki M A ,et al.Fostering Childcare E-Service: Design and Development of a Software Application[J].International journal of interdisciplinary telecommunications and networking, 2022.