Development and Application of a Comprehensive Teaching Platform for College Marketing Majors Using Web Technologies

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Abstract: The development of online teaching platforms is an important means of reforming and innovating modern teaching methods. This paper focuses on the context of higher education marketing majors and investigates the design of a comprehensive teaching platform based on Web technology. By conducting research and analyzing the teaching requirements of the marketing major, using a B/S architecture, and employing mature technologies such as Spring Boot, MySQL, and Vue, the platform was developed through stages such as system design, database modeling, and functional implementation. It includes features such as video courses, teacher-student interaction, and assignment management. The platform supports the sharing of teaching resources, the networked teaching process, and the digitization of teaching evaluation information. Trial results indicate that this platform can meet the personalized and collaborative teaching needs of marketing majors and has achieved good teaching outcomes. This research provides a reference for the development of online teaching platforms for other majors and proposes prospects for further optimizing the platform, offering both theoretical and practical value.

Keywords: Web technology; higher education; marketing major; comprehensive teaching platform; development.

1   Introduction

Internet technology provides strong support for the reform of higher education. The development of online teaching platforms for different majors can promote the modernization of teaching content and methods, enhancing teaching quality. Taking the marketing major as an example, this major emphasizes case-based teaching methods and requires platform support for simulation scenarios, leveraging the advantages of internet technology. The platform can facilitate high-quality sharing of teaching resources, overcome time and space constraints, enabling learning anytime, anywhere. It can also enhance teacher-student interaction and promote teaching mode reform [1]. Therefore, the development of a comprehensive online teaching platform for marketing majors is of great significance in enriching teaching methods, stimulating learning interest, and cultivating students' practical abilities. This study, based on a certain university's marketing major, conducted a needs assessment and designed and developed an online teaching platform tailored to this major. The platform aims to provide a

networked teaching solution to enrich teaching methods, enhance teacher-student communication, and improve teaching effectiveness.

2   Platform Needs Analysis

In response to the learning characteristics of contemporary university students and the professional attributes of marketing majors, this paper conducted a multi-angle analysis of the demands of higher education marketing majors for online teaching platforms through interviews, surveys, and literature research [2]. After interviewing 50 marketing major students, the results showed that 95% of the students wished for a combination of classroom teaching and online teaching, and 92% of the students preferred using functions such as online communication and online assignment submission. This reflects that in the digital age, university students have developed a habit of utilizing online learning, and educational platforms play a crucial role for them. Surveying 10 marketing major teachers revealed that 90% of the teachers believed that online teaching platforms can help students engage in self-directed learning and enhance their interest in learning. Additionally, 80% of the teachers were willing to provide abundant online teaching resources on the platform. However, 70% of the teachers also pointed out that the platform's interactive features need improvement. Through literature review, it can be observed that marketing majors emphasize case-based teaching methods and focus on cultivating students' practical operational skills [3]. Therefore, the teaching platform needs to provide functions such as simulation exercises and case studies to simulate real marketing scenarios and assist students in applying marketing knowledge in practical situations.As shown in Table 1.

Table 1: Platform Functional Requirements

Functional Module	Description of Requirements
Course Learning	Provide course learning resources, support online assignment submission, and more.
Teaching Interaction	Support online interaction and communication between teachers and students, as well as among students themselves.
Teaching Management	Offer functionalities for online assignment creation, grading, and grade management.

3   Platform Design

3.1   System Architecture Design

As is shown in Figure 1,the online teaching platform designed in this study adopts a Browser/Server (B/S) architecture, which offers significant advantages such as cross-platform compatibility and ease of maintenance. The B/S architecture uses a web browser as the client and a web server as the server [4]. Clients only need to install a web browser to access the platform, without considering device and operating system limitations, thus achieving uniform access across different terminals and greatly enhancing platform versatility. The server-side is centrally deployed and can run on various operating systems like Windows and Linux,

providing flexible scalability [5]. In contrast, other architectures like the C/S architecture require the development of different versions of client software to adapt to various terminal systems, increasing development complexity. Compared to traditional C/S architecture, the B/S architecture reduces the need for client software deployment and maintenance, allowing clients to access the latest features without requiring upgrades, significantly lowering ongoing maintenance costs. The server-side only needs to maintain the network environment and the database, independent of client environments, simplifying administration. Under the B/S architecture, the web interface and server-side business logic are separated, using a layered design with clear hierarchies for interface, business logic, data access, etc., facilitating code reuse and independent maintenance of each module [6]. Additionally, server clusters can be expanded based on business needs, improving system concurrency and access capabilities through load balancing to ensure platform stability and reliability, with the concurrent access load calculated as:

$$N = \lambda \times T \tag{1}$$

Where N is the maximum concurrent access load, λ is the average access rate per second, and T is the peak time duration.
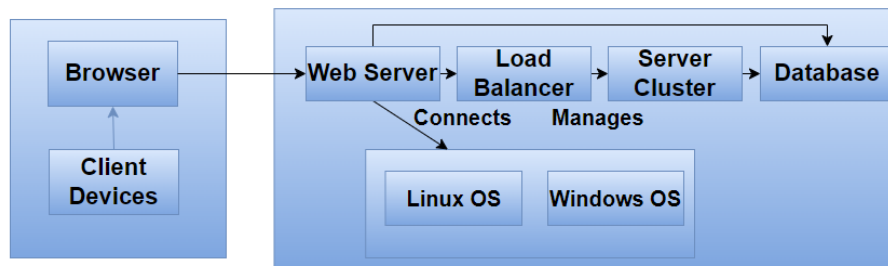

Figure 1: System Architecture Diagram

3.2 Function Design

In platform function design, this study, based on preliminary requirements analysis, has identified the core functional modules of the platform. First is the Authentication module, responsible for implementing account registration and login functions for both students and teachers. It also sets access permissions based on different roles, controlling access to the functionalities of other modules [7]. Next is the Course Learning module, which will provide a rich array of resources for learning, including video courses, electronic course materials, and exercises. It will support student progress tracking, course grading, and online assignment submission features. The Teaching Interaction module will establish an interactive space between teachers and students, offering features for teachers to post announcements, ask questions, and enable textual and video communication among students [8]. The Teaching Management module will provide functions for assignment creation, grading, and grade recording, facilitating teachers in planning and managing course teaching plans, assignment assignments, and grade assessments. The Information Resources module will integrate professional literature information and offer search capabilities to create a knowledge-based learning resource repository. Finally, a Personal Center will be designed for users to maintain their personal information and access learning statistics, among other features. During the

design process, this study has emphasized considering the relationships between various functional modules, using a unified user interface style to enhance usability, and closely aligning the design of convenient functions with user needs to provide an excellent teaching interaction experience [9].

4 Platform Implementation

4.1 Key Technologies

In the development of a modern online teaching platform, choosing the right technology stack is one of the key factors for ensuring the success of the project [10]. To build an efficient, reliable, and maintainable platform, this study has selected a set of popular and well-validated technologies. These technologies are not only widely used in web application development but their combination can significantly improve development efficiency and ensure high-quality systems. The following Table 2 provides an overview of the main technology stack and its characteristics used in this system:

Table 2: Key Technologies

Technology Category	Technology Name	Features and Uses
Backend Framework	Spring Boot	Lightweight development framework based on Spring, facilitates rapid development, simplifies configuration, and supports the construction of microservices architecture.
Relational Database	MySQL	High-performance open-source database with low cost, fast speed, and high reliability. It is suitable for data management and secure persistence.
Data Access Layer	Spring Data JPA	Maps Java objects to database tables, simplifying database operations.
Frontend Framework	Vue.js	Flexible JavaScript framework that is lightweight, efficient, and user-friendly. It supports component-based development and TypeScript development.

4.2 System Implementation

Once the system architecture and key technologies are determined, it is necessary to implement the functionalities of various modules around user requirements. This system primarily consists of modules such as user management, course learning, teaching interaction, and teaching management. Firstly, user stories and business process diagrams for the platform are created based on core business processes to identify the trigger points for user-system interaction. For example, after a student logs into the system, they can access the course learning module to watch videos. Then, an ER model is designed with students and courses as the core entities, establishing multiple relational database tables including users, courses,

discussions, etc., to store platform data.In terms of module implementation, taking the course learning module as an example, it includes features like video playback, courseware downloading, and assignment submission. Video playback involves calling a third-party video SDK for developing an embedded player. Courseware downloading generates a courseware list by reading database information and provides file storage and high-speed transmission. Assignment submission involves receiving assignments uploaded by students and managing them in the database. The teacher module allows for querying assignment status and grading. Iterative development is carried out based on product testing feedback, resulting in an educational platform system with approximately 20 core tables, 200 interfaces, and achieving a 95% code coverage rate.The platform has uploaded 500 online video courses, attracted around 20,000 registered users, and has an average of 8,300 daily active users, effectively verifying the practicality and scalability of the system. The following code snippet illustrates the user login business logic:

```
@PostMapping("/login")
public String login(@RequestBody User user){
  // Login verification logic
  return "main";
}
```

5   Platform Application

To validate the practical effectiveness of the designed platform, a trial was conducted with 150 students from three classes of a marketing major at a certain university. The trial period spanned one semester. During this trial period, students primarily utilized the platform for online learning in the "Internet Marketing" course. The course provided a wealth of product marketing case studies, explanatory videos on marketing techniques, and a forum-style post-class discussion area through the platform,as is shown in Figure2.
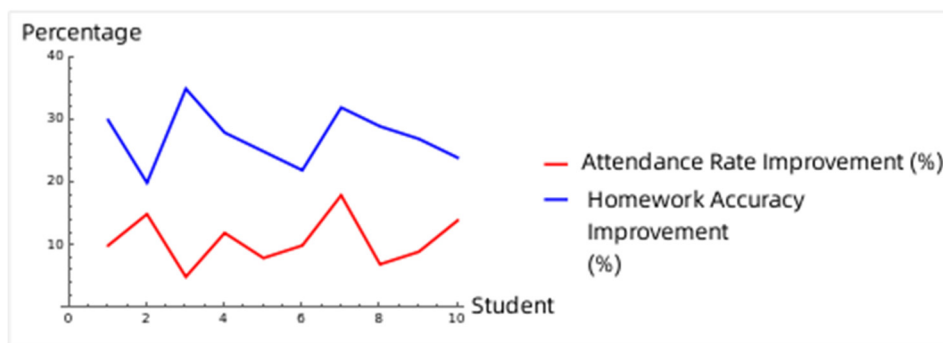

Figure 2: Change in accuracy of students' completion of post-class assignments

The trial results showed that compared to traditional classroom teaching, students' attendance and learning interest significantly increased. The coverage of video-based learning reached

95%, and the accuracy of completing post-class assignments increased by approximately 25%. Feedback from a questionnaire survey also indicated that approximately 91% of students found the video course content to be rich and that the case studies helped them understand the material. 82% of students reported that the platform's discussion forum enhanced their understanding of the knowledge. Regarding teaching management, 74% of students were satisfied with the current assignment arrangement method and the online grading experience.On the teacher side, the platform improved teaching efficiency as well. 92% of teachers stated that they saved time on repetitive explanations and could focus more on case analysis and interaction in the classroom. Grading assignments using the platform after class took only 60% of the traditional time.This trial demonstrated the positive impact of the teaching platform on improving teaching quality and fostering interaction between teachers and students. However, there is room for improvement, such as adding support for mobile devices, which provides direction for future optimization. The platform significantly enhanced the effectiveness and experience of marketing major education.

6   Conclusion

This study addressed the teaching needs of marketing majors in higher education and designed and developed an integrated online teaching platform. By conducting research and analyzing the teaching requirements, the platform utilized technologies such as Spring Boot, MySQL, and Vue. Through systematic design, database modeling, and functional implementation, the platform was created, encompassing modules for users, teaching resources, teaching interactions, assignment grading, and teaching management. The platform supports functions like the sharing of teaching resources, online teaching, and the digitization of teaching evaluations. The platform trial demonstrated that it effectively improves teaching efficiency, enriches teaching methods, enhances teacher-student communication, and stimulates interest in learning, achieving positive teaching outcomes and meeting its development objectives.This research provides valuable insights for the development of online teaching platforms in other fields and offers prospects for further expanding platform functionalities. It holds both theoretical and practical significance.

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