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Research and Design of Teaching Case Database for Resource Sharing in the Context of "Internet Plus"

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Abstract: To meet the needs of colleges and universities for training compound talents in the era of "Internet plus" and improve students' practical ability, this paper adopts the strategy of teaching resource sharing, and through the analysis and research of the current situation of teaching cases, puts forward a solution of teaching case database management system designed with SSM lightweight architecture. The main functions of this system include user management, permission management, and teaching case library management. The system effectively integrates teaching case resources and provides a teaching case resource sharing and management platform that is user-friendly, secure, and easy to operate for different types of users. This platform not only integrates case resources from different disciplines, but also stimulates students' learning motivation, promotes the effective combination of theory and practice, and improves learning effectiveness. The implementation of a teaching case library provides important reference value for improving the level and quality of information technology education.

Keywords: Teaching cases; Resource sharing; Case library; SSM architecture; Teaching quality

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1. Introduction

With the rapid development of computer technology and network technology, under the new engineering background of the "Internet plus" era, education informatization is the inevitable trend of education and teaching reform. Information technology has been widely used in education, teaching and social life. It is changing the traditional education theory, education philosophy and teaching mode, and has become a hot spot of teaching reform research in colleges and universities. In 2018, the Ministry of Education released the Education Informatization 2.0 Action Plan, which clearly pointed out that building a large platform of "Internet plus education" and building a new talent training model in the context of "Internet plus." Therefore, to adapt to education informatization and promote the improvement of the quality of professional talent training in colleges and universities, it is of great significance to build a teaching case base based on teaching resource sharing [1].

A teaching case describes a practical context in the teaching process, and its effective application can assist

classroom teaching and effectively achieve teaching objectives. Teaching case resources require the support of a case library system. How to digitize, process, store, update, maintain, and manage teaching case resources is the main problem faced by academic administrators and frontline teachers in universities [2].

Constructing a teaching case library allows teachers to choose appropriate cases for teaching, which is beneficial for reducing their workload. The reserve of a certain number of high-quality teaching cases provides reliable support for the implementation of case teaching. The construction of a teaching case library is conducive to the sharing of teaching resources, not only strengthening the connections between different disciplines but also facilitating communication and exchange among teachers [3,4]. In short, constructing a teaching case library can provide teachers with various teaching cases covering different disciplines, helping them better design and implement teaching activities. On the other hand, it can also stimulate students' internal motivation and combine theory with practice to improve their learning effectiveness through case studies. As a new teaching resource management method, a teaching case library can conveniently and efficiently manage teaching cases and resources and improve teaching quality and efficiency.

2. Key development technologies

In the process of system development, the IntelliJ IDEA integrated development environment was adopted, which involved relevant network technologies such as SSM, Vue.js, Element UI, MySQL, etc. The main technologies are introduced as follows.

2.1. SSM

SSM refers to Spring + Spring MVC + MyBatis, a commonly used combination of Java enterprise application development frameworks [5]. As a lightweight framework, SSM has the advantages of relatively simple configuration and use, making the project development process more efficient. At the same time, it is highly flexible, allowing developers to customize and expand according to specific needs [6].

Spring provides powerful IOC and AOP capabilities, supporting modular development and code decoupling, improving code maintainability and testability. Spring MVC provides a flexible web development environment that supports "RESTful" style request processing and view rendering, making web application development simpler and more efficient [7]. MyBatis provides a simple and easy-to-use database access solution, fully utilizing the flexibility of SQL and providing caching and performance optimization functions, improving the speed of database access and scalability.

2.2. Vue.js

Vue.js is a commonly used front-end framework that is powerful, flexible, and easy to use, suitable for building applications of various scales, from simple interactive components to complex single-page applications [8]. It focuses on the development of visual layers, enabling developers to easily build interactive and responsive web applications by providing concise syntax and flexible component systems [9].

2.3. Element UI

Element UI is a desktop component library based on Vue.js, providing rich and reusable UI components that can handle complex interaction logic for building modern web applications. The component supports responsive design and can adapt to screens and devices of different sizes, providing a better user experience. At the same time, it provides rich theme customization options, allowing developers to customize the style of components according to personalized needs to adapt to different brands and design styles.

2.4. MySQL

MySQL is renowned for its ease of use, high performance and reliability, providing solutions ranging from small personal projects to large enterprise-level databases. MySQL database has advantages such as small size, fast speed, low overall cost of ownership, open source code, support for multiple operating systems and development languages, excellent performance and stable service [10].

3. System function and role use case analysis

3.1. Functional requirements analysis

The teaching case library management platform provides a centralized platform for managing and sharing teaching cases to support educational institutions, teachers, and students in obtaining, creating, and sharing teaching cases during the teaching process.

3.1.1. User management

The platform needs to support user registration, login, and personal information management functions. Users can log in and access based on their identity roles (administrator, teacher, student).

3.1.2. Teaching case upload and management

Teachers or administrators can upload teaching cases, including their titles, keywords, difficulty, course information, etc. The platform should provide convenient case management functions, such as editing, deleting, searching, sorting, etc.

3.1.3. Teaching case search and filtering

Users can search and filter cases based on keywords, difficulty, courses, and other conditions to quickly find the required teaching cases.

3.1.4. Teaching case browsing and downloading

Users can view the detailed content of teaching cases and choose to download the viewed teaching cases.

3.1.5. Comment and evaluation function

Users can comment and evaluate teaching cases to share their views and experiences and provide feedback to teachers and other users.

3.1.6. Audit management

It includes the review and release management of teaching cases, conducting audits based on the quality, availability, copyright and other aspects of teaching cases to ensure the quality and copyright of teaching cases.

3.1.7. User permission management

The platform needs to set corresponding access controls based on the user's role and permissions, ensuring that users from different roles can only access teaching cases and functions for which they have permission.

3.1.8. Data statistics and analysis

The step includes collecting and analyzing data such as the number of views and evaluations of teaching cases to understand their usage, popular cases, user evaluations, and other information, providing decision-making

support for teachers and administrators.

3.2. Role use case analysis

By analyzing the needs of different user roles, the functions that the system needs to provide can be determined. Each user role may have different operations and permission requirements, and use case analysis can clarify the functions required by each role, so that the system design and development team can meet these functional requirements [11]. This system has three default roles of users: administrator, teacher and student. The main functional use case analysis is as follows:

3.2.1. Administrator role

The first type of user in the system has the highest authority and is responsible for the system's operation and maintenance. The main functions of the administrator role include user management, case management, case review, case browsing, course management, message management and batch registration.

3.2.2. Teacher role

The second type of user in the system has higher permissions, and the main functions of the teacher role include personal case management, student management, course management, personal message management, case browsing, and batch registration.

3.2.3. Student role

The third type of user in the system has general permissions, and the main functions of the student role include case browsing, interactive communication, etc.

4. System design and implementation

4.1. System design principles

The teaching case library management system's design and implementation process follows the principles of practicality, security and stability, openness and standardization, scalability and maintainability. The specific description is as follows:

4.1.1. The principle of practicality

The design and implementation of a teaching case library management system should truthfully reflect the functional needs of users for teaching cases and follow the principle of practicality to design and select the most valuable and feasible solutions.

4.1.2. The principle of safety and stability

In order to ensure the security and stable operation of the system, the development and design process of the teaching case library management system should not only pay attention to the isolation and protection of information data but also consider the effective sharing of data resources [12]. The security issues involved in system use mainly include the standardization of username and email formats, password verification and encryption, application privacy and security protection for users, and system security.

4.1.3. The principles of openness and standardization

The teaching case library management system can achieve interoperability and interconnection with servers,

accept access from various mainstream browsers, have open development data interfaces, and cross-system portability [13,14].

4.1.4. The principles of scalability and maintainability

With the increasing emphasis and investment in case resource construction in course teaching, the platform functions of the system will inevitably be further optimized. A system design architecture with scalability and maintainability can greatly reduce maintenance difficulties and payment costs when adding, optimizing and improving system functional modules [15].

4.2. Technical architecture design

A teaching case library management platform based on B/S architecture, designed with a three-layer architecture, divided into a presentation layer, business logic layer, and data access layer.

4.2.1. Presentation layer

Using the Vue.js + Element UI framework to design and display the user interface.

4.2.2. Business logic layer

Using Java language and based on Spring and Spring MVC framework, it realizes the processing and control of business logic.

4.2.3. Data access layer

Using the MyBatis framework to achieve access and management of databases.

4.3. Front-end display design

The goals that front-end display design needs to achieve include the following aspects.

4.3.1. User interface design

Design an intuitive and user-friendly user interface that allows users to browse, search, and manage teaching cases easily. Adopting similar layouts and styles ensures consistency in system page style and operation, enabling users to quickly familiarize themselves with and operate the system.

4.3.2. Navigation and navigation bar

Design a clear navigation structure to enable users to quickly find and use the required functions. To improve user navigation efficiency, display the main functional modules and page links in the navigation bar or sidebar.

4.3.3. Search and showcase teaching cases

Design an efficient and practical teaching case search interface and a beautiful teaching case display page. Ensure that users can quickly find the required teaching cases and improve their satisfaction with using these teaching cases.

4.3.4. User interaction and feedback

Design user interaction and feedback mechanisms to enable users to interact effectively with the system and receive immediate feedback. For example, prompt messages for successful or failed operations.

4.4. System functional structure design

The teaching case library management system adopts a structured and modular design concept, which divides the system into multiple functional modules based on users' actual needs. Each functional module is independent of the other in terms of functionality but interconnected in terms of information, enabling communication and collaboration among various functional modules to meet the functional needs of different types of users in the system. The main functional modules of the teaching case library management system include the teaching case library management module, permission management module and user management module.

4.4.1. User management module

The user management module, as an important component of this system, provides personal information data support for the normal operation of the system. The administrator module implements functions such as user addition, user information modification, user deletion, and user search. The student management module is a function of the teacher end, which realizes the functions of adding students, modifying student information, deleting students, and searching for students. The registration and login module is the foundation of this system. Users who are using this system for the first time must successfully register before they can log in to the system.

4.4.2. Permission management module

The permission management module is the foundation of the entire system and provides a basic guarantee for the normal operation of other modules. The authority management module is mainly divided into user authority management and menu management. User authority management is mainly used to assign roles to each user and manage user rights through the division of roles. Menu management mainly achieves permission control for different roles by restricting their access to various menus, allowing them to use different functional modules.

4.4.3. Teaching case library management module

The teaching case library management module is the core module of this system. Its main function is to classify and manage the teaching cases in the library. The module includes the case management module, the course management module and the comment management module.

The case management module includes the uploading, downloading, modifying, deleting, searching, and browsing of teaching cases, as well as the administrator's review of user-uploaded files to meet the construction needs of the teaching case library in the system. Course management module includes adding, modifying, deleting, and searching course information in teaching. By managing the courses in teaching, teaching cases can be classified, enabling users to quickly and accurately find the required teaching cases when searching for a teaching case library. The comment management module includes adding, deleting, and searching comment information in teaching cases. Through the comment management module, the teaching case library management system can promote communication and interaction among users, allowing them to share their opinions, raise questions, or provide suggestions. This helps to improve the quality of teaching cases and increase user engagement and satisfaction.

5. Conclusion

Under the background of the "Internet plus" era, the construction of the teaching case base adopts modular thinking and lightweight technical architecture design, which is suitable for general operating environment requirements. It is convenient for later function updates and expansion. The design of the case library system is

based on permission management, which can meet the functional needs of different system users and provide a digital resource-sharing platform for teaching case sharing, learning, and communication for teachers and students. The practice of the case resource-sharing teaching reform concept is of great significance in enriching teaching resources, promoting the application of case teaching, improving teaching quality, and providing personalized learning support. It plays a positive role in promoting the development and improvement of education and teaching.

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Disclosure statement

The authors declare no conflict of interest.

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