

Enhancing Discrete Mathematics Learning Through a WeChat–Oriented Teaching Platform

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Absrtact: By analyzing the knowledge architecture of discrete mathematics and considering the practical needs of the course, this study develops and designs a network–based teaching platform using the WeChat public platform. The platform, built on the SSH framework (Struts2, Spring, Hibernate) with MySQL as the backend database, has undergone functional testing and successfully demonstrated its effectiveness in supporting teaching activities. This implementation provides valuable insights for the ongoing advancement of intelligent education and interactive learning solutions.

Keywords: WeChat public platform; interactive teaching platform; SSH framework; MySQL; intelligent education

1 Introduction

While most schools currently utilize existing online teaching resources to deliver professional knowledge, these platforms often fail to facilitate real–time interaction between teachers and students. Although they address basic instructional needs, they lack robust mechanisms for live feedback and dynamic engagement. To overcome these limitations, a smart classroom teaching platform leveraging WeChat(微信)s public platform can significantly enhance learning outcomes. However, there is still no way to realize that teachers teach online while students give feedback on problems, and the interaction is still not strong enough. The teaching mode of smart classroom teaching platform can enhance students’ interest in learning and enhance their enthusiasm to participate in course teaching through timely interactive technology. Wechat as a popular app, its built–in wechat public platform has important teaching assistant function, as well as a complete mobile learning platform, which can meet the needs of interactive teaching. Teachers can use wechat public platform to send knowledge points related to course content, and students can use extracurricular time to learn relevant knowledge; Teachers can use wechat videos to guide students, answer questions,

and test online. Teachers can also use their spare time to answer students’ life, feelings, life and other more private growth questions.

2 key theories

2.1 Wechat public platform

The WeChat Public Platform is a powerful extension service within Tencent’s WeChat ecosystem that integrates seamlessly with other core components like Enterprise WeChat and Mini Programs, offering developers versatile API interfaces to connect third–party applications with WeChat’s massive user base through its open developer mode, enabling system expansion and enhanced functionality by facilitating bidirectional communication between external systems and WeChat clients while maintaining the platform’s robust security and stability standards.

2.2 SSH framework

The SSH framework is an integrated open–source solution for web application development that combines three key Java technologies: Struts for MVC–based presentation layer control, Spring for comprehensive application management and dependency injection, and Hibernate for robust data persistence through ORM. This multi–layered architecture separates concerns into four distinct tiers – presentation layer (Struts), business

logic layer (Spring), data persistence layer (Hibernate), and domain module layer – enabling developers to rapidly build maintainable, scalable web applications while ensuring clean separation of components, reduced boilerplate code, and improved system organization through Spring’s centralized management of the entire framework.

2.3mysql database technology

MySQL is a widely-used open-source relational database management system (RDBMS) that organizes data into structured tables with defined relationships. As one of the most popular database solutions, MySQL implements the standard SQL (Structured Query Language) for database access and manipulation, ensuring compatibility and ease of use. The system is particularly renowned for its combination of performance advantages, including compact size, fast processing speeds, and low total cost of ownership. Its open-source nature allows for community-driven

development and customization while maintaining reliability, making it an ideal choice for applications ranging from small-scale projects to enterprise-level systems, including the proposed WeChat-based discrete mathematics teaching platform where efficient data management is crucial for handling course materials, user information, and interactive content.

3 system design

According to the actual teaching content and examination link of discrete mathematics, the system adopts automatic test paper generation through the decision table. The teacher can make statistical analysis on the students’ test scores, failed courses and error prone points. The system also provides a teacher-student communication module to realize the function of one-to-one question answering and group notification; Through mobile location attendance and two-dimensional code attendance two ways to achieve the role of supervision.

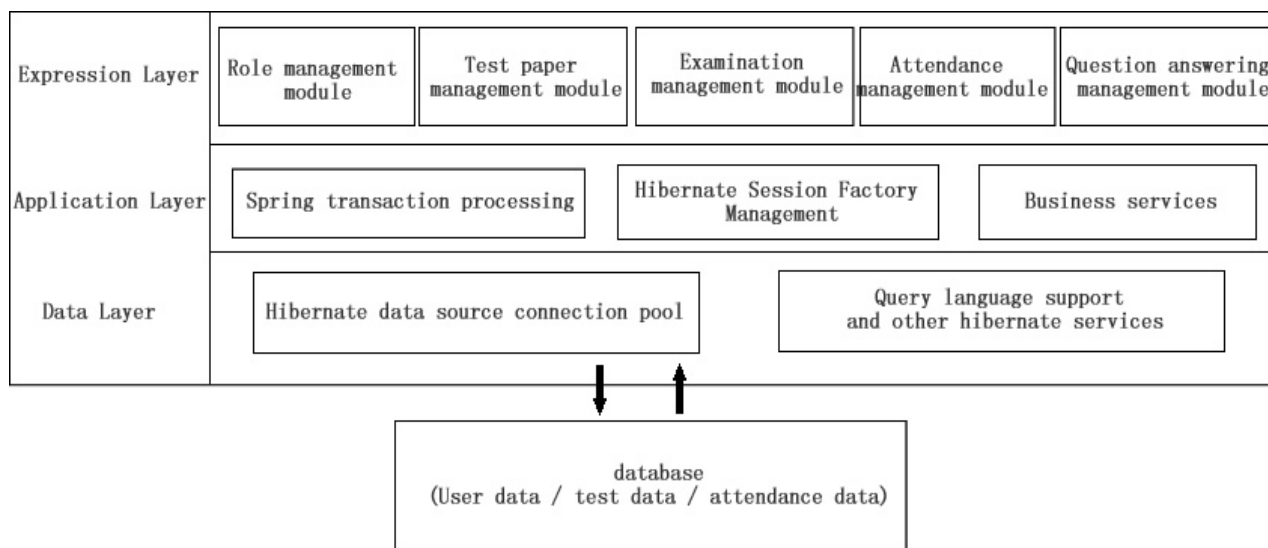


Figure 1 system architecture

3.1 system architecture design

The system applies SSH framework. The system adopts MVC design pattern and is based on B / S architecture. It is mainly divided into presentation layer, business logic layer, data access layer and database. The system presentation layer uses the specific functional modules designed by the previous

needs analysis. The user roles of the functional modules are teachers, students, reviewers and universities. The business logic layer uses Struts2 to process the data of related business classes and display the data in the form of JSP pages. Hibernate’s task is to operate and use the database, while spring is responsible for managing the above two frameworks. The data access layer uses c3p0

data source to realize connection pool, and the database design uses MySQL database. Alibaba cloud server is selected as the server to interact with users on wechat public platform through callback system application server.

3.2 system database design

The reasonable standardization of the database, its level will affect the success of the whole system to some

extent. Therefore, for the development of a complete background system, the design of the database needs to be in accordance with the object and relationship described in the early E-R diagram, so as to convert to the specific definition of the data structure, and finally realize the accurate data of the database. The specific content of the interactive classroom teaching platform is designed as follows:

Table 1 User administrator information table

dataname	datatype	length	constraint
id	int	10	
shenhe_id	int	10	primary key
username	char	40	
password	char	20	

Table 2 Teacher information table

dataname	datatype	length	constraint
id	int	10	
teacher_id	int	10	primary key
username	char	40	
password	char	20	
phonenummer	char	20	
name	char	20	

Table 3 Student information table

dataname	datatype	length	constraint
id	int	10	
student_id	int	10	primary key
username	char	40	
password	char	20	
phonenummer	char	20	
name	char	20	

Table 4 Chat information record table

dataname	datatype	length	constraint
record_id	int	10	primary key
chat_id	int	10	foreign key
time	char	datetime	

3.3 function module design

3.3.1 WeChat official account menu page

Application configuration discrete mathematics

intelligence classroom teaching platform specific functions, login www.mp.weixin.com The official account number is registered with the official account

number of WeChat account, and the subsequent certification is completed. After verification, WeChat will provide developers with AppID accounts and AppSecret of public platform. According to the above two identities, the official account can be obtained by interface invocation. The ports on the platform depend on access token. The user should click on the menu key at the bottom of the dialogue window of the official account to enter the interface of the interactive classroom platform. The related menu is designed according to the coordination of the supplier

and the demander, and then the related design work is completed in the background.

3.3.2 teacher side

(1) Q & A

The function of Q & A includes the display of students' chat record table, which includes chat time, chat content and message reply box. In addition, it also includes message group sending function, which includes two functions, one is to send group messages, the other is to view and manage the history of group sending.

Table 5 Chat information table

dataname	datatype	length	constraint
chat_id	int	10	primary key
teacher_id	int	10	foreign key
student_id	int	10	foreign key
content	varchar	255	
sender	char	60	
record	int	60	
time	datetime		

Table 6 Knowledge information table

dataname	datatype	length	constraint
topic_id	int	10	primary key
topicname	varchar	60	
topiccontent	varchar	255	

Table 7 Topic management information table

dataname	datatype	length	constraint
knowledge_id	int	10	primary key
topic	varchar	255	
A	char	40	
B	char	40	
C	char	40	
D	char	40	
answer	varchar	255	
difficult	char	40	
type	char	40	
score	float	20	

(2) Management of question bank and test paper

To manage the question bank, you can input

the important knowledge test points and questions of each unit into the database as the question bank. Test



paper management function, according to the number of questions selected by the teacher automatically generate test paper, the algorithm used here is random selection method, at the same time, in order to avoid its shortcomings, in the development of automatic test paper, reasonable combination of knowledge and difficulty.

(3) Attendance check in

By obtaining the real-time location of the teacher end, the data is sent to the background server, and the student end will display the specific attendance information. Click the attendance button of the course to complete the attendance. After the operation, the teacher goes to the attendance page to check the attendance of the students.

(4) Error prone statistics

After the students pass the examination, the corresponding student scores will be fed back to the teacher channel. This function includes two functions, one is the score view function. The page can see the name of the test paper, the test students and the test scores.

(5) Upload and download courseware

Teachers and students use the upload function to upload all kinds of courseware and homework. In the process of uploading, the user will be informed to upload the required content. The user can choose to confirm according to the needs. After completing the operation, you can see the courseware just uploaded. On this page, the user can download and delete it. When the file upload page submits a request, the request is sent to the upload function key. This is a Struts2 action, which processes the upload request. In addition to the name attribute of two form fields, the action also contains headimagecontenttype and headimagefilename.

3.3.3 student terminal

(1) Take the exam

After the teacher has set up the content of the test paper, the corresponding test paper will be displayed in the student channel interface, and the limited time test will be conducted. After the time, the test paper will be

handed in automatically, and the student's test results will be sent to the teacher interface.

(2) Self examination

In the spare time, students can choose the number of questions according to their own learning level, so as to form a test paper for online testing. After answering the questions, the answer content will be displayed.

(3) Q & A

In the spare time, students have doubts in learning. They can send the questions that need help through the communication and question answering interface. After the teacher receives the information, he will give feedback in time.

(4) Attendance check in

When the course starts, the teacher sets the attendance course name and attendance class location through the mobile wechat terminal, and then starts attendance. Students can click on the corresponding course attendance, and finish the positioning attendance within 3 minutes. If it is overtime, it will be late; At the same time, repeated attendance is invalid, and finally the attendance distance will be fed back to the teacher's mobile terminal.

4. Conclusion

In this study, 112 test cases are designed, 108 of which pass the test cases, 2 of which block, and 2 of which fail. The pass rate of test cases is 96.4%. In addition, many on-site tests have been carried out in the actual classroom, and 35 students and teachers have participated in the positioning attendance, QR code attendance and paper test in the classroom. The whole class has completed the above functions, The test basically passed. Therefore, the platform initially realizes the overall design requirements and related tasks discussed by the supplier and the demander.

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