



Design and Development of Course Teaching Assistant System Based on WeChat Applet

Taking the Basic Courses of Communication Engineering Specialty as an Example

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Abstract. The popularity of WeChat and the convenience of WeChat applets provide new ideas for the innovation of blended teaching methods. In order to solve the problem of neglecting students' learning progress and stagnation points in traditional teaching in colleges and universities, which leads to poor learning effect and unmeasurable blended learning effect, this paper designs a teaching assistant support system based on the WeChat applet development framework for the professional courses of communication students. This achievement first makes full use of WeChat's convenient use, social display and high customer stickiness, opening up new methods for students to review and interact with teachers after class, and making up for the shortcomings of traditional teaching methods. Secondly, make full use of online learning time, with multiple functions such as homework submission, message interaction, question feedback, etc., so that learning is not limited by time and space. Through the comparative analysis of the blended teaching effect in three semesters and the questionnaire survey of the teaching class, it is found that the WeChat program designed in this paper not only improves the teaching quality of teachers and the learning efficiency of students, but also has certain innovation, popularization and good practical value.

Keywords: blended teaching · WeChat applet · Teaching assistant support system · pragmatic value

1 Introduction

Blended learning is a learning method that combines traditional classroom learning with online learning under the guidance of the concept of "learner centered, focusing on the cultivation of learners' multiple intelligences" [1]. With the continuous development of information technology, it provides new innovative ideas for hybrid teaching reform [2], such as its gradual transformation from "online + offline" mode to "technology + resources" mode [3]. It can be seen that how to choose a highly functional and flexible technical means to enhance learning effectiveness is particularly important.

By September 2018, WeChat had 1.082 billion active users [4]. In view of the large number of WeChat users and the high frequency of practicality, it is necessary to integrate

WeChat into the teaching process. At present, many scholars have studied the combination of WeChat applets and teaching. For example, Liao Dejun and others [5] discussed the feasibility of developing a medical parasitology auxiliary teaching platform based on WeChat applets; Ye Zhanhang [6] and others put forward prospects and suggestions for the specific application of WeChat widget in ideological and political courses in colleges and universities; Zhang Liying [7] developed the corresponding WeChat widget for the course of < Educational Technology Theory and Innovation >.

In order to better promote the mixed teaching reform in colleges and universities and promote the deep integration of modern educational technology and curriculum, this study will achieve the following goals: Aiming at the required courses for students majoring in communication engineering, starting from the analysis that it is difficult for teachers to accurately find the problems arising from the students' learning process in the traditional teaching process, this paper designs a teaching assistant support system based on the WeChat applet, which includes the functions of auxiliary work, interactive Q&A, question feedback and learning statistics. And Finally, according to the students' learning feedback results, the use effect of the designed WeChat widget is evaluated.

2 Basic Theory and Overall Architecture Design

2.1 WeChat Applet Development Framework

The development framework of WeChat “applet” is based on the MINA framework. MINA is a network communication application framework based on Java technology. The feature of this framework is that it uses Java asynchronous input and output technology and can support TCP/UDP protocol. Users can not only select the thread model according to the actual needs, thus realizing the application of multi-thread model, but also provide Java object serialization service, virtual machine pipeline communication service, etc. In addition, MINA can quickly develop high-performance and highly scalable network communication applications.

Among them, IoService is the entry of the application, which can be used to add multiple IoFilters. These IoFilters conform to the responsibility chain pattern and are called by the IoProcessor thread. IoHandler is a business processing module. It does not need to care about the actual communication details in the business processing class, but only needs to process the information transmitted from the client. IoFilter is used to filter customer requests or data sent to customers. Some commonly used filters IoFilter, such as log records, blacklist filtering, compression filtering, SSL encryption, etc.

The application process of MINA framework is relatively complex, but it has good flexibility in the use process. For example, developers can customize various coding methods, encryption algorithms, log records, etc. according to their own needs. At the same time, the framework is applicable to server application scenarios with multiple user requirements such as mail servers, streaming media servers, IM servers, etc. Based on this feature, WeChat applets are developed using the MINA framework, which can meet the needs of more users and provide great convenience for developers. As shown in the figure, “app. Json” is the global configuration for the entire applet. In this file, developers can configure which pages the applet consists of, configure the window background color, configure the navigation bar style, and configure the default title. As

the core content of the applet, the page is generally composed of three files: “index.js” is the logic processing code, which is mainly used to define the data of the page; “Index.Wxml” is a layout file that is mainly used for the overall structural design of a page; “Index.Wxss” is a style sheet that determines how various components should be displayed. In addition, “app.js” is the script code for an applet. Developers can listen to and process the lifecycle functions of the applet, declare global variables, and call the rich APIs provided by MINA in this file.

2.2 Structure Description of Course Assistance System Applet

The course assistance system is developed based on the WeChat applet development framework. Developers do not need to build servers, and the authentication exemption allows them to directly use the API provided by the platform for business development. In this way, developers can experience developing services with native APP in WeChat in a simple and efficient way.

The system structure mainly includes three parts: mobile end, cloud server end and WeChat server end, as shown in Fig. 1: The mobile end is a user interface used to complete the information interaction between the trained user and the system; The cloud server end stores and manages user information, security knowledge, question library, exam records, consultation answers and other data. At the same time, the functions of editing, guiding and exporting background data are realized; The WeChat server end completes the registration, creation and release of the applet, and provides various interface authentication services to ensure the security of the interaction between the front-end and back-end of the applet. In addition, the security training system WeChat applet is divided into two parts: the front end (mobile end) and the back end (cloud server end).

3 System Function and Realization

The functions of the applet are divided into two modules, as shown in Fig. 2: teacher module and student module. The teacher module mainly includes teacher registration, knowledge point management, and student learning feedback. The student module mainly includes course unit display, unit knowledge point summary and explanation (including learning feedback), and exercise answering.

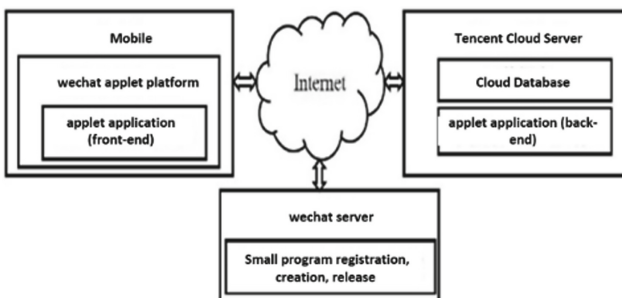


Fig. 1. Schematic diagram of the system structure

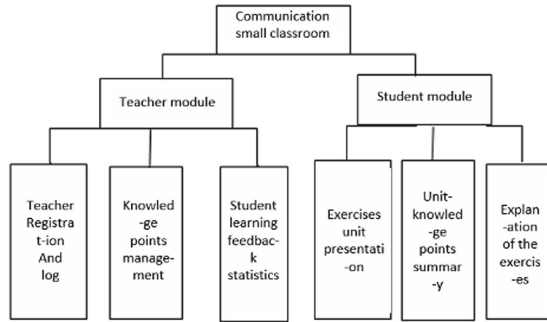


Fig. 2. System function diagram

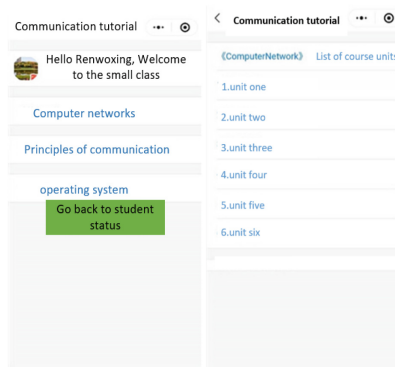


Fig. 3. Course management and course unit interface

3.1 Teacher Module

3.1.1 Teacher Registration and Login

Each teacher can apply for his/her own account and set a password, log in and manage his/her own knowledge module.

After successful registration, teachers can log in to the system to maintain and view the course knowledge points they are responsible for, as shown in Fig. 3

From the figure, we can see that when the instructor selects a specific unit, he can see a list of all the knowledge of the unit. In order to facilitate students to learn and review knowledge points intuitively, visually and quickly, each knowledge point is composed of knowledge point name, keywords, knowledge point description, knowledge point photos and small videos. At the same time, according to the content update, the instructor can add, delete and modify the knowledge points at any time and anywhere.

3.1.2 Student Learning Feedback

The student learning feedback includes two aspects: whether the knowledge points are understood (how many people have understood and how many people have not) and the

problem answering feedback (how many students have answered this question and how many people have chosen A, B, C and D respectively), as shown in Fig. 4

3.2 Student Module

The content that students see in this part is the same as that seen by teachers. Please refer to the list of teachers' knowledge points and the detailed page. The difference between the two is that each student can give feedback after learning each knowledge point.

Each unit has corresponding typical examples to help students test and consolidate knowledge, and enhance the memory of knowledge points that are not firmly grasped, as shown in Fig. 5.

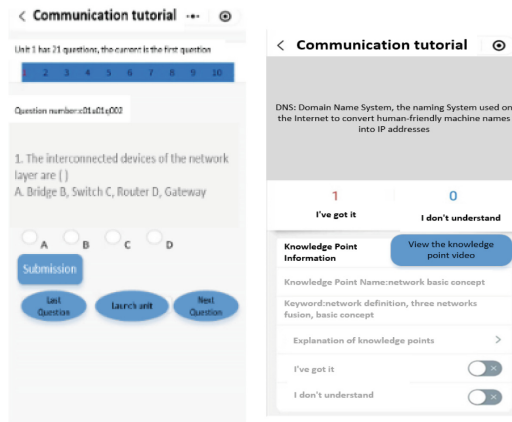


Fig. 4. Statistical interface for students' answers

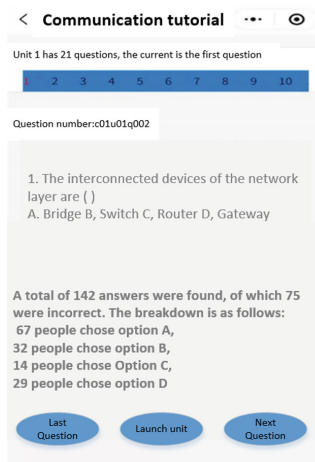


Fig. 5. Student Answer Interface

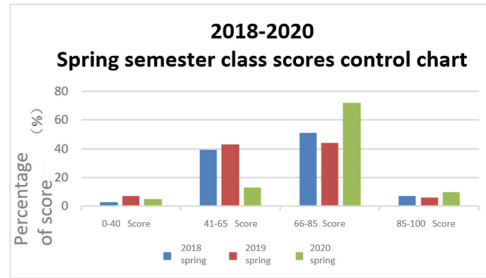


Fig. 6. 2018–2020 Spring semester class scores control chart

4 Blended Teaching Effect Test

Through the practical test of three teaching cycles, students' learning performance has improved significantly after the mixed teaching method based on WeChat small program. From 2019 to 2020, after testing the topics of the same topic, We were surprised to find that the proportion of students who scored between 41 and 65 decreased significantly, while the proportion of students who scored between 65 and 85 increased significantly, as shown in Fig. 6.

At the same time, we conducted a questionnaire survey on the use effect of WeChat applets. The respondents were three classes in the spring semester of 2020 who participated in the curriculum reform. A total of 156 test papers were distributed and 156 questionnaires were collected. From the results, we found that the feedback satisfaction was more than 90%, whether it was the satisfaction of program design, the help of autonomous learning, or the acceptance of knowledge. The vast majority of students have a positive and recognition attitude towards the use of WeChat applet for learning. They believe that the new course content and learning method are superior to the traditional model, and through the practice of this method, the students' abilities of self-study, knowledge integration and independent thinking have been trained. When learning other knowledge, students pay more attention to the system structure of knowledge, tend to summarize the relationship and similarities and differences between knowledge, and achieve the goal of teachers' teaching methods and students' rapid self-study.

In addition, we are also soberly aware from the survey results that there are still some problems in our program, such as the low proportion of objective questions and the lack of automatic analysis of students' mastery, which encourage us to continuously improve the designed WeChat widget in the follow-up research process.

5 Conclusion

This paper designs a course assistant platform system based on WeChat applet, which is developed by WeChat developer platform, uses mobile client to learn, and cloud server as background support, which simplifies hardware investment and maintenance costs, and has the characteristics of simple system structure, low development difficulty, and flexible and safe configuration. The system opens up a new way for after-class

review and teacher-student interaction, which can make up for the shortcomings of traditional teaching methods, and realize the functions of online exercise answering, question feedback learning and exchange question answering.

By using the small program, the teacher can not only update the knowledge in time, but also grasp the learning situation of the students in time, including: (1) the teacher knows which knowledge points the students have understood and which have not. (2) The teacher has a clear understanding of the students' answers to each question. (3) The teacher checks the background data of the system to understand the login time of students and their learning habits. (4) The whole teaching team can discuss in a timely manner according to the feedback of the system, revise the problems existing in the knowledge points, adjust the teaching methods, and improve the teaching quality.

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