Design and Implementation of Intelligent Learning Companion System Based on WeChat Mini Program

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***Abstract*—During the period of COVID-19 epidemic situation, in order to ensure that students can study normally, the Ministry of Education has issued measures to "suspend classes without stopping learning". Therefore, the traditional forms can't meet the needs of learners, more and more people like online education. The existing online learning platforms cannot perfectly meet the learning needs of students, so the students need an online learning system that can meet their individual needs and improve learning efficiency. This article introduces an intelligent learning companion system, the system based on the advantages of WeChat Mini Programs can help learners achieve online learning and meet personalized needs.**

Keywords-intelligent learning companion system; WeChat Mini Programs; online learning

I. INTRODUCTION

The progress of society and Internet technology drive the reform and progress of education model. It injects new vitality into the development of education. As a new way, online education is reshaping traditional teaching and learning mode[1].There are some problems with traditional online education platforms, such as long download time, taking up storage space, and reducing running speed. Since the function of WeChat applet is always available and within reach, there is no need to uninstall it, which has gradually attracted people's attention and developed into a trend. So the intelligent learning companion system will have good application prospects.

The content structure of this article is as follows. First of all, it introduces the online education platforms on the market and their advantages and disadvantage in recent years. Secondly, it illustrates the technical advantages of WeChat Mini Programs, and combines it with user needs to design the function of the system. Next, it explains how to achieve the registration module, learning module and information module of the system. Finally, it summarizes the characteristics and improvement methods of the system.

II. RELATED RESEARCH RESULTS

With the rapid development of online education, more educational forms have emerged in Chinese online education industry in recent years. It also attracts more and more educational institutions to join the industry, so it promotes the development of online education. There are some popular online education products.

In 2011, a team led by Jiajia Huang created 51Talk, an online English education platform. It mainly focuses on English education for young people and uses an interactive one-to-one live teaching mode. The platform has independently developed online interactive teaching software (Air Class). It can be adapted to both computer and mobile.

In 2013, Alibaba Group launched Xue Taobao, an online education platform. It is mainly to build a platform, and use a hybrid platform model of 2B + 2C. It connects high-quality education platforms, excellent teachers and excellent courses for students to learn, allows any individual to publish their own teaching videos or apply for the right to live broadcast online, providing teaching experience for those who have the skills[2].

In 2014, a team led by Xiangdong Chen created Genshuixue, an online education institution. It uses a combination of live broadcast and tutoring as a teaching method, and this course content includes primary and secondary school courses. This platform provides students and teachers with opportunities for communicating. In addition, students can use the platform to watch instructional videos. It also helps to record students' learning content and habits. So, it can analyze students 'interest in learning, and it provides personalized services for students.

In 2016, Tencent launched an online education platform called Tencent Classroom. With the advantages of QQ client, Tencent Classroom enables teachers and students to communicate with each other. Its main educational resources include videos, electronic textbooks and exercises. Tencent Classroom uses an interactive live broadcast model, therefore, it can enhance the stickiness of teacher-student interaction and online teaching activities[3].

Compared with traditional teaching, online education breaks through the limitations of time and space. It helps users efficiently use trivial time, so the development trend of online education will be even better. Their shortcomings in practical applications are as follows. First of all, the PC device is too heavy to carry. Secondly, the mobile app needs to be downloaded and installed. Finally, their promotion costs are relatively high. Therefore, the intelligent learning companion system based on the advantages of WeChat Mini Programs has obvious advantages. WeChat is the most used social software in China, it provides natural conditions for promotion of WeChat Mini Programs. WeChat Mini Programs can be used

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without installation, so it reduces the complexity of the operation. And it can be used on iOS and Android platforms.

III. Design of Intelligent Learning Companion System

A. Related Technologies

This system mainly involves three aspects, such as MINA framework, cloud development and WeChat Developer Tools. Their details are as follows: (1) MINA Framework. The WeChat Mini Program is a project file structure based on the MINA framework. The core technologies mainly include page JavaScript, WXML, and WXSS[4]. The core of the MINA framework is a responsive data binding system. This system is divided into two parts: View and App Service. The view is composed of WXML and WXSS files, they are used to control the page structure and component style, respectively. WeChat provides WEUI to make the page more in line with the style adopted by WeChat. The App Service is composed of JS, it uses JavaScript as the language for writing JS files. The developers mainly use JavaScript to develop business logic, and use the WeChat Mini Programs API to complete business needs. It is not enough for a service to display only pages, and the service needs to interact with the user, such as click feedback to users, get user's location. WeChat Mini Programs use JS files to handle user operations(URL)[5]. The MINA framework is shown in Figure 1, (2) Cloud Development. It provides three basic capabilities of database, storage and function[6]. It gives developers the ability to use the cloud, so developers do not need to build servers, and it reduces the development procedure, cost and time, (3) WeChat Developer Tools. It is an editor and professional software for WeChat Mini Programs[7]. After the developer creates a new project, the page display area can reflect the running result of the code in the editing area. Tools in the debugging area help developers debug code more efficiently.

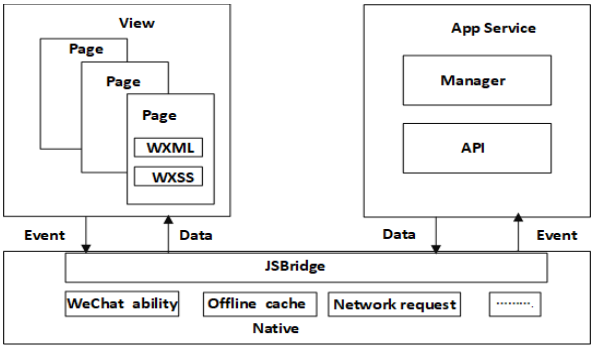

Figure 1. MINA framework

B. Related Functions

WeChat Mini Program is a new way to connect users and services, it can be spread in WeChat and has good experience[8]. The advantage of WeChat Mini Program is that it is more lightweight and fragmented than mobile APP. The system is based on the WeChat Mini Program, which can help users achieve the requirements of functions available everywhere. Since the system uses the style provided by the WeChat Mini Program to form the basic style of the page, the operation of the system is more universal. And it is based on WeChat users to increase the convenience of online promotion. The development of Mini Program is based on Web technology, and has many similarities with traditional Web development, so developers with Web development experience can easily master Mini Program[9].Developers can create multiple collections in the database, and directly read and write the records in the collection. At the same time, you can also manage database data in the console. The storage provides stable and secure cloud storage services for the system, and it support any unstructured data storage, such as video and pictures. So the development time of the system is shorter than that of the traditional APP. There is no need to build servers, which greatly reduces the difficulty of development. In addition, the system can help users have a native APP experience, and reduce the burden of traditional APP.

In the survey, it was found that users' needs for learning applets are basically divided into three aspects. First of all, its pages are simple and easy to operate; Secondly, it needs to increase the feedback function for learning progress; Thirdly, it should add exercises to test learning results. In response to these needs, the system uses WeChat Mini Program as the carrier and uses the extended practical functions provided by WeChat for Mini Program to improve the user experience. The system has designed three functional modules, including registration module, learning module and information module. The functional structure of this system is shown in Figure 2.

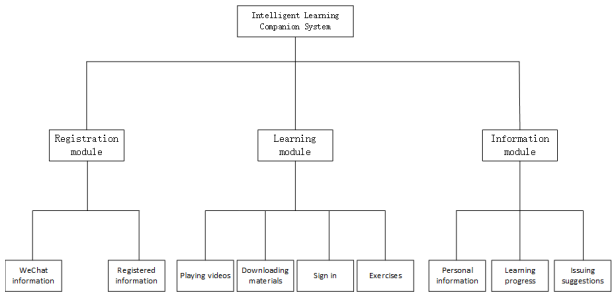

Figure 2. Functional structure of the system

- Registration module. The user uses the system by scanning the QR code, their registration information is directly saved to the database. The system will obtain WeChat information authorized by the user, such as avatar, address.
- The learning module mainly includes the functions of playing videos, downloading materials, signing in and exercises. Students watching videos and downloading materials before or after class can help students understand the learning content and the degree of knowledge in a timely manner. The signing in function of the system will strengthen the students' self-control. The exercises function can be divided into four parts: answering questions, collecting exercises, statistical errors and feedback, they are combined with each other to meet user needs for learning.
- The role of the information module is mainly to reflect the user's learning progress and provide a process

evaluation. The function of issuing suggestions not only helps developers improve system but also collects the needs of users.

IV. Implementation of Intelligent Learning Companion System

A. Registration Module

The content of the WXML file of the registration page uses the UI component library iView. The login function of the system is mainly to judge the existence of the account and the matching of the account and the password. We need to add the code to connect to the database in the JS file. The event handler function can complete the interaction between the View and the App Service, and use the wx.showToast() prompt information in the interface API.

B. Learning Module

1) Videos and Materials: We set the scroll view area of the page through scroll-view to achieve the goal of vertical scrolling. The wx:for helps developers achieve looping to get the elements of the array, and get the video title, cover and content, wx:key specifies the unique identifier of the items in the list, so that the components of the list have their original state. Media API realizes the function of playing videos and previewing materials. The event handler function of the video playback in the JS file can play a single video. The <video> component is mainly used to play video, and its three attributes are used to record video events, and support some video formats [10]. Videos and materials are obtained through the storage path, wx.clound.downloadFile() implements file download, users can use the mobile phone to download the data to the album. The page of playing video is shown in Figure 3.

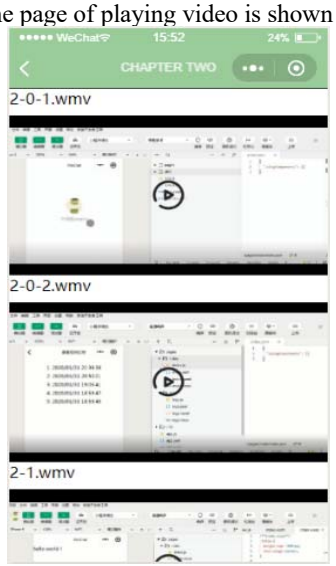

Figure 3. Page of playing video

2) Sign In: Obtaining the current date is the prerequisite for the sign in function. First of all, adding Date() method in JS file to get current date; Then, use require to load the util.js in the JS file. Finally, adding judgment logic code in the onload() to make the sign-in page display days. wx.setStorageSync() stores the user's data in the local cache to implement the function.

3) Exercises: This part is mainly to feedback the user's mastery of knowledge and learning situation. The system has designed four functions with the goal of improving user learning efficiency, such as answering questions, collecting exercises, statistical errors and feedback. There are two types of these topics: single-choice and multi-choice. The collectible questions save the question information to the list. The system compares the result of the question with the original answer to determine the correctness of the answer, and then adds the exercises to the corresponding list.

C. Information Module

The module includes three parts: displaying user information, learning progress and issuing suggestions. The functions of each part are introduced as follows.

1) Displaying User Information: The style of the user information page is composed of the WEUI, the system obtains the logged-in user's WeChat and registration information by connecting to the collection.

2) Displaying User Information: Adding function in common.js to record the user's learning progress and save results. We can call the function on the learning progress page to draw a pie chart. If users watch the course video for more than 80% of the total time of the video, the system will increase the learning progress and score. However, repeated viewing of videos by users cannot increase learning progress and score. The core code is shown in Figure 4.

```
if(scale>=0.8 && that.updateflag == false){
  if(user.videoid != null && user.videoid != "" && user.videoid != undefined){
    var index = user.videoid.indexOf(videoid);
    if(index<0){
      if(user.videoid != null && user.videoid.length>0){
        user.videoid.push(videoid);
      }else{
        user.videoid.push(videoid);
      }
      if(user.score!=null){
        user.score = user.score + item.score;
      }else{
        user.score = item.score;
      }
```

Figure 4. Core code

3) Issuing Suggestions: The This feature helps users submit text and picture information, So developers can visually manage data. Adding a collection to save the information that has been submitted. When the information is submitted successfully, the system will jump to the history list page. So users can see all the suggestions that have been submitted. The issuing propose page is shown in Figure 5.

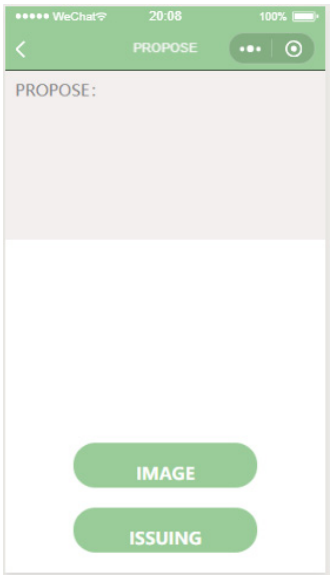

Figure 5. Issuing propose

V. FUNCTION AND APPLICATION

At present, the WeChat Mini Program is released as an experiential version for teachers and students, and the experiencers reflect that the system has good stability, compatibility and experience. In terms of stability, students can use system learning anytime and anywhere, and play the role of systematic partner; In terms of compatibility, the system can run normally on iOS and Android systems; In terms of experience, the interface of the system is friendly and easy to operate. Especially the function of the system can meet the individual needs of students. Therefore, applying the system in learning can not only help students improve learning efficiency, but also help teachers understand the situation of students.

VI. CONCLUSION

By analyzing the problems of the existing online learning platform and combining the characteristics of WeChat Mini Program and cloud development technology, the system realizes the functions of playing videos, exercises and displaying learning progress. During the development of the system, developers have a deeper understanding of the language, tools, components, and APIs of WeChat Mini Program. Due to the limitations of technology and resources, the number of system experiencers and problems is relatively small. In terms of pages, when the user browses a page that contains pictures, there will be a slight delay in the pictures on the page. The reason for this situation is that all the pictures are stored in the cloud storage. In terms of exercises, there are only two types of exercises in the system. Developers should increase the types of exercises and the mode of answering questions. In terms of feedback on learning results, if the results of the exercises are combined with the learning progress, the system will form a more comprehensive evaluation standard. In the future, we can continuously improve the system to make it more in line with the characteristics of learning.

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