



Design of English and American Literature Online Learning System Based on Android

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Abstract. In order to improve the user response rate and maintain the stability of the online learning host, an online learning system for British and American literature based on Android is designed. From the perspective of user behavior and use case structure, the learning needs of the accessed user objects are analyzed, and based on this, a learning behavior model is established. Using Java programming language, debug the operation mode of the technical architecture, and combine functional modules at all levels to complete the design of the online learning system for English and American literature based on Android. The comparative experimental results show that with the application of the Android based online learning system, the user response rate has been increased to 15.9 bit/ms, and the stable running time of the learning host has been fully extended, which can play a role in promoting the stability of the online learning host.

Keywords: Android System · British and American Literature · Online Learning System · Use Case Structure · Learning Needs · User Behavior · Programing Language

1 Introduction

With the rapid development of wireless networks, 4G has been marketed through the decline of smartphone prices, and the popularity of Android applications has reached an unprecedented height. As the Android system launched by Google is open source, mobile terminal devices produced by major manufacturers have chosen the Android system as the first operating system, making various applications based on the Android system widely developed and applied. For example, in the field of education, various mobile online learning systems based on the Android platform are changing people's traditional learning methods, making students' learning no longer limited by time and region, and can achieve independent learning, which is very suitable for people to effectively use their leisure time to learn, and is conducive to students' faster access to knowledge content. In order to promote and popularize online learning, it is necessary to design and develop an online learning system suitable for people [1]. At present, there are a wide variety of online learning systems in the market, and they have been applied to

a certain extent. Only by selecting a suitable online learning system can the learners' learning be most effectively promoted. Online learning systems can be classified in many ways according to different functions, learning objects, etc. Of course, in the process of using the online learning system for learning, a series of problems brought about by the network science, such as easily distracted learning and not timely answering questions, will also affect the efficiency of online learning to a certain extent.

Online learning system refers to putting all kinds of learning resources in the network server, and the whole learning process is carried out with the network as the carrier. The communication and exchange between students and teachers, students and students are conducted through the network. This new online learning mode has some unique advantages compared with the traditional learning mode: 1. Teaching mode: the online learning system realizes the multimedia of teaching information, no longer like the traditional classroom teaching, mainly relying on the teacher's teaching. You can add rich and colorful teaching information such as pictures, sounds, videos, etc. At the same time, the organization of online learning content is more using the hyperlink information organization method, which has a good human-computer interaction experience, and can provide more fun for learners to learn; 2. Learning objects: The resources of the online learning system are stored in the network server, which is the same as other resources stored in the network server. These resources can be freely obtained on the network. They are open and shared. Anyone who is connected to the Internet has crossed the constraints of geographical location on people's learning needs; 3. Learning mode: The network is characterized by 24-h service, and learning will no longer occupy the whole time of learners, making autonomous learning a reality; 4. Teaching arrangement: The online learning system requires learners to log in and use after self registration, so that learners have a personalized learning space in the cyberspace, and students can arrange their own learning content and work and rest time to facilitate self-management of learners. On this basis, an online learning system of British and American literature based on Android is designed. First, from the perspective of user behavior and use case structure, analyze the learning needs of connected user objects, and then build a learning behavior model based on this. Finally, using Java programming language, debug the operation mode of the technical system architecture, and combine the functional modules at all levels to complete the design of the online learning system of British and American literature. The experimental results show that the designed system has good performance.

2 Analysis of Learning Needs

For the analysis of user learning needs in the online learning system of British and American literature, which involves user behavior definition, use case structure design and learning behavior modeling, this chapter will conduct in-depth research on the above contents.

2.1 User Behavior

Through reading British and American literature works, students can be encouraged to independently complete the exploration and thinking of life, and gain life insights in

reading. In terms of British and American literary works, the relationship between the author and the work is inseparable. When students read literary works, they also have a direct dialogue and emotional exchange with the author, and feel the author's thoughts, feelings and ways of thinking through the text [2, 3]. Through reading British and American literature, students can be encouraged to strengthen emotional communication with works, taste life, gain insights, and then experience a full and positive life state, and gain comprehensive improvement of quality and ability.

Let α , δ represent two unequal English and American literature learning parameters, P_α , p_α represent the user learning indicator and learning feature value based on parameter α , respectively, P_δ , p_δ represent the user learning indicator and learning feature value based on parameter δ , respectively, β represents The user learning behavior discrimination conditions, combined with the above physical quantities, can express the learning ability of the user objects in the online learning system for English and American literature as:

$$I = \frac{\sqrt{P_\alpha}}{\sqrt{P_\delta} + \sum_{\substack{\alpha=1 \\ \delta=1}}^{+\infty} \beta (p_\alpha^2 - p_\delta^2)} \quad (1)$$

The construction of the online learning system of British and American literature is based on the Android program framework. With the system host fully open, the operation behavior of the accessed learning users involves the following aspects:

- (1) The online learning system is mainly provided to students for online learning of courses to assist classroom teaching, deepen the mastery of course knowledge, improve students' learning and practical ability, and improve students' learning interest, so as to facilitate students' mutual learning. Therefore, the system should provide such functions as course selection, online learning, online answering, score management, resource sharing, etc.
- (2) In order to better serve students' learning, students' learning can be more interactive. The online learning system allows teachers to participate in students' online learning process, so as to understand students' learning progress and learning status, and provide students with teaching suggestions and methods in a timely manner. The system should provide curriculum management function, test management function, teaching resource management function and other functions.
- (3) In order to give full play to the effectiveness of the online learning system, the online learning system not only supports the traditional teaching method of teachers and students, but also provides independent learning for non school students. The system should be able to provide a series of independent learning functions for non online users. Therefore, the system also needs to improve the role of tourists. Any user can register a tourist account, You can use the learning function of the open course of the online learning system.
- (4) The administrator is the super user of the system, and is mainly responsible for the daily maintenance of the system, system data backup, system security and other work to ensure the normal operation of the online learning system. The main

functions include user management, data management, log management, resource management, and course management.

The complete user behavior relationship is shown in Fig. 1.

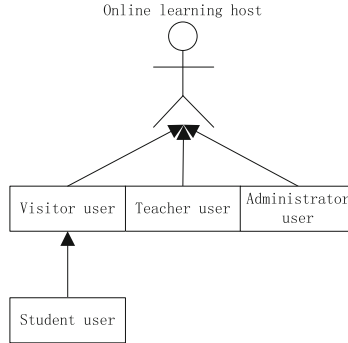


Fig. 1. Detailed explanation of user behavior relationship

As the lowest access object, student users accept the scheduling and management of tourist users in the online learning system of British and American literature, while teacher users and administrator users, as the intermediate access objects of the online learning system, only accept the direct management of the online learning host.

2.2 Use Case Structure

Through the investigation and analysis of various users of the system and the security requirements of the information management system, we can get the main use cases of the online learning system, including login function, registration function, personal information management function, my course function, course management function, resource management function, user management function, log management function, data management function, etc. According to different user roles, the functions are different. The main use case diagram of the system can be obtained by using the object-oriented analysis method, as shown in Fig. 2. The student users have the use cases of login, personal information management, resource management, online learning and online examination; Teachers have use cases such as login, personal information management, curriculum management, resource management, learning effect evaluation, etc.; The system administrator has login, user management, log management, data management and other use cases; Tourists have user registration, password retrieval, online learning, online examination and other use cases.

Under the condition that the user's learning behavior does not change, the use case structure function capability of British and American literature online learning system can be expressed as:

$$O = \chi^2 I + \left(\frac{1}{\phi \left(\frac{u_{\min}}{u_{\max}} \right)} - \bar{U}^2 \right) \quad (2)$$

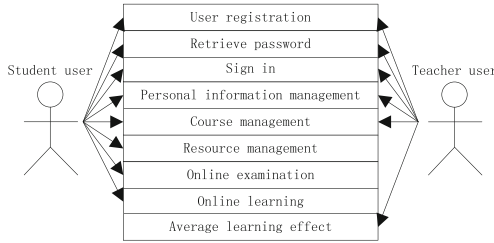


Fig. 2. Use Case Structure

Among them, χ represents the literary aesthetic coefficient, ϕ represents the literary performance characteristics, u_{\min} represents the minimum value of the use case vector, u_{\max} represents the maximum value of the use case vector, and \bar{U} represents the average of the coefficient u_{\min} and the coefficient u_{\max} .

In order to improve the security of the system, each user in the online learning system must log in with his/her own account and password before using the system. Users who have not registered with the system can register themselves. When logging in, users can log in to the system through their user name and password. The system provides corresponding service solutions according to the type of users.

2.3 Learning Behavior Modeling

The social reality reflected in British and American literary works is helpful to understand that literary works with western cultural background are an intuitive reflection of social culture and realistic development, among which classic literary works are the effective crystallization of human wisdom and civilization, with extremely important appreciation value. British and American literary works directly reflect the cultural background of the West. They are the feelings and thoughts of foreign writers based on social reality and their own perception. At the same time, they are processed with certain literature and art, and truly reflect the system and environment of Western society [4]. Through the study and study of British and American literary works, students who are not native speakers of English can intuitively feel the differences and similarities between eastern and western cultures, so that they can understand the internal differences of different languages from different cultural backgrounds, and more intuitively feel the charm of English language, which is where the learning value and significance of British and American literary works lie.

In the online learning system of British and American literature oriented to Android system, when modeling the learning behavior, the activity diagram is one of the graphical tools for modeling the dynamic behavior of the software system in the unified modeling language. The activity diagram describes the process of participants' specific interaction with the system in order to achieve their own goals. In essence, an activity diagram is also a kind of flow chart, which only represents the control flow from one activity to another. It describes the sequence of activities, supports the expression of conditional and concurrent behaviors, and solves the problem that text event flows are difficult to read and understand.

The so-called learning behavior modeling is also called user learning feature modeling based on English and American literature data. Under the effect of the Android system framework, the greater the cumulative amount of English and American literature data, the stronger the unit performance ability of learning behavior [5]. In the modeling process, in order to accurately define the expression form of British and American literature data, the data sample characteristics and online learning intensity should be solved simultaneously. The specific calculation expression is as follows:

$$\begin{cases} \varepsilon = \left(\frac{\gamma R}{\hat{y}}\right)^2 O^{-2} \\ \varphi = \frac{1}{\sqrt{\dot{r} O w'}} \overline{W}^{-\left|\frac{\ln \tilde{e}}{\ln \bar{e}}\right|^2} \Big|_{\ln \tilde{e} \neq \ln \bar{e}} \end{cases} \quad (3)$$

In the formula, ε represents the characteristics of the data sample, φ represents the online learning intensity, \hat{y} represents the real-time learning coefficient of the user object, γ represents the learning ability definition coefficient, R represents the total amount of student learning per unit time, \dot{r} represents the data sample identification coefficient, and w' indicates the learning authority held by the administrator, \overline{W} represents the unit accumulation of online learning samples, \tilde{e} represents the literary measure of the data sample, and \bar{e} represents the unit performance mean of the literary feature.

On the basis of formula (3), let r_1, r_2, \dots, r_n represent the values of n non-zero English and American literature learning data samples, and \bar{E} represent the transmission mean of the learning data samples in the online learning host. Combine the above physical quantities to deduce the learning behavior. The modeling expression is:

$$Q = \frac{\varepsilon \cdot \varphi}{\bar{E}^2} \exp\left(-\frac{1}{r_1^2 + r_2^2 + \dots + r_n^2}\right) \quad (4)$$

In addition to meeting the functional requirements of students, teachers, administrators and other users, the online learning system also needs to meet the requirements of security, ease of use, maintainability, openness and reliability. For the sake of security and clear responsibilities, the online learning system is required to have certain authority management functions, and each functional module must have corresponding authority to enter and operate. The system shall be able to prevent data loss and destruction caused by various misoperations or physical damage. Prevent illegal users from acquiring web pages and background data, and prevent illegal users from operating the system database illegally.

3 System Development and Design

In order to realize the smooth operation of the online learning system for British and American literature, it is also necessary to improve the Android technical architecture under the influence of the Java programming language, and then provide a stable connection environment for the relevant functional modules on this basis.

3.1 Programming Language

Java is a concurrent, class-based, object-oriented, and specially designed possible computer programming language implemented with as few dependencies as possible. Its purpose is to enable application developers to “write once and run everywhere”, which means that running from one platform to another does not require recompiling code [6].

It is stipulated that s_{\min} represents the minimum value of English and American literature data coding based on Java programs, s_{\max} represents the maximum value of English and American literature data coding based on Java programs, λ represents the guiding coding coefficient, \vec{S} represents the single coding step value of English and American literature data samples, and f represents the coding parameters of data samples based on Android system architecture. With the support of the above physical quantities, the simultaneous formula (4) can define the application expression of programming language as:

$$A = Q^2 \left[2 \sqrt{\frac{\lambda(s_{\max} - s_{\min})}{f \cdot \vec{S}}} \right] \quad (5)$$

In the process of Android application programming, interface control, event processing, network applications, data storage and I/O are also very important aspects. These are also very mature processing methods in the Android system architecture. For an application on a mobile device, the design of the interface is the key point to leave a first impression on the user. The quality of the interface design will directly affect the user’s choice of applications. In the Android development tool, a set of simple and direct interface layout and design methods are provided. Developers use XML files to develop and design UI interfaces. Through simple operations, they can add interface interaction buttons, design layout locations, adjust the format of displayed text and related beautification pictures [7]. The layout interface can be directly called through the code in Java programs, which makes it easier for developers to make excellent interfaces. At the same time, separating the front-end interface design from the related logic control code can bring great convenience for later maintenance and modification, and better reflect the principle of three-tier architecture.

Since the coding of English and American literature data samples in the Java language meets the three-tier architecture mode, the following conditions must be met when the coding parameter f of data samples is taken:

$$f \leq \frac{d_1 + d_2 + d_3}{t_1 \cdot t_2 \cdot t_3} \quad (6)$$

Among them, d_1, d_2, d_3 respectively represent the coding vectors in the first, second and third layer architectures, and t_1, t_2, t_3 respectively represent the real-time coding coefficients of British and American literature data samples in the first, second and third layer architectures.

For English and American literature online learning system, its convenience and communication attributes are its biggest characteristics. Under the increasingly developed network conditions, Android system provides a complete set of network application interfaces. In Android applications, support for Web services is achieved through remote

calls. At the same time, Android has a built-in HttpClient, through which you can easily send http requests and obtain http responses. Android simplifies communication with the server through the built-in HttpClient.

3.2 Technical System Architecture

The three-tier architecture of Android system is the mainstream design framework for the development of online learning system application software of British and American literature. Based on the idea of modular programming, the three-tier architecture has become a standard of module division method, which can achieve the purpose of decomposing software project requirements and reducing the confluence between modules. The most outstanding advantage of adopting the three-tier architecture is that it is no longer necessary to overturn the previous work because of some changes in customer requirements during the software development process, and the entire program does not need to be modified. When requirements change, it is only necessary to modify one or more layers of the three layers according to the changed content to meet the user's requirements, sometimes just a few code changes [8]. In this way, the maintainability of the code is greatly enhanced, the confluence between modules is reduced, and the cooperation between developers working at different layers is also facilitated to the greatest extent. Programmers can achieve parallel development only by following the corresponding interface standards. Finally, the development of the entire application is completed by combining all layers together.

Generally, the three-tier architecture includes the presentation layer, business logic layer and data access layer. The purpose of adopting the three-tier architecture is to realize the software design idea of "high cohesion and low coupling". The relationship between the three-tier architecture is shown in Fig. 3. The specific functions are as follows: 1. Presentation layer: provides users with an interactive operation interface to show the data content to users, that is, what they see. 2. Business logic layer: it is responsible for the processing of key businesses and the data transmission with the presentation layer and the data access layer. Operation for specific problems, that is, the operation of the data layer and the processing of data business logic. 3. Data access layer: It realizes the operation of adding, deleting, modifying and querying data. This layer directly operates the database, including adding, deleting, modifying and querying data.

In practical applications, in order to effectively divide the three-tier architecture of the Android system, you can distinguish it in the following ways:

- (1) Data access layer: It mainly depends on whether the British and American literature data samples in the data layer contain logical processing. Each of its methods mainly completes the operation of data files, without other operations.
- (2) Business logic layer: mainly responsible for the operation of the data layer, that is, the logical processing of British and American literature data samples obtained from the data layer.
- (3) Presentation layer: it is visible to the accessed learning users and the outermost layer that can be accessed by the application. It is mainly used to display the requested British and American literature data samples and receive the data information input by the user.

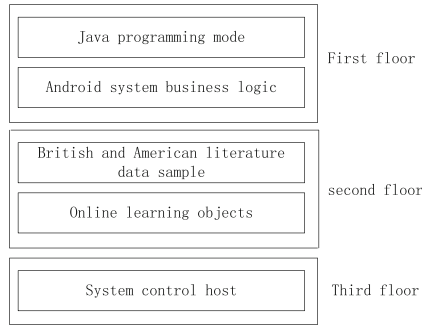


Fig. 3. Three layer architecture of Android system

3.3 Functional Module

The function module of English and American literature online learning system consists of three parts: client, management and server.

(1) Client function module

Learning users can log in and watch English and American literature learning materials. Log in to the Internet, extract the video information from the server database, and display it on the client. Users can also transmit operation information to the server through display information and store the information in the database [9].

(2) Management end function module

In order to provide convenience for administrators, you can design a server URL linker on the computer client. It mainly realizes administrator login, video type management, video list display, video details view, user comments view and other management functions.

(3) Server function module

The server side functions of the system mainly include administrator video type management, video input, video list display, video details view, comment information input, etc. When a user logs in to the Internet using the client, the client connects to the system server. The system server implements the following functions: when the user logs in, the system server verifies the legitimacy of the user; When the user views the video, the server will now accept the user's request and access the database query. According to the user's request, the server will access the database and return the query results to the user client in the form of learning materials through the Android system [10]. When the administrator logs in to the Internet through the computer, the browser is connected to the server, the server displays the interface of this function to the administrator, and the administrator performs corresponding operations.

Generally, in the process of Android development and programming, there are two event processing mechanisms. One is event processing based on listening, that is, binding specific event listeners to various operations in the Android interface to provide corresponding feedback operations when an event occurs; The other is based on the processing of feedback events, which rewrites specific callback methods in

Android components or in activities [11]. Developers only need to rewrite related functions, regardless of which interface components need to call these methods.

Assume to represent the sample connection conditions of British and American literature, and the value expression is as follows:

$$\vartheta \in [1, +\infty) \quad (7)$$

Let μ represent the carrying capacity of the Android architecture for the learning host, \dot{g} represent the functional characteristic value of the British and American literature data samples, \bar{H} represent the average cumulative quantity of the British and American literature data samples in the functional module, ϑ represent the display coefficient of the Chinese and American literature data samples, \hat{j} represent the query characteristics of the data samples based on the Android architecture, and the inequality condition of $\hat{j} \neq 0$ is always true. With the support of the above physical quantities, Formula (6) and Formula (7) are used to deduce the connection expression of the functional modules of the online learning system of British and American literature as follows:

$$L = \frac{\sqrt{\sum_{\mu=1}^{+\infty} (\dot{g} \times \vartheta)^2 - \bar{H}^2}}{A \sum_{\mu=1}^{+\infty} \theta \cdot \hat{j}} \quad (8)$$

The online learning system mainly provides services for users through a large number of British and American literature data samples. These data parameters are also resources stored in the network and can be accessed by users. Information management is mainly achieved through the management of the link address of the Android system. Here, data can also be classified according to the type to help users more effectively select British and American literature data, Save time for users to select interesting videos and improve learning efficiency.

4 Example Analysis

According to the principles shown in Fig. 4, select the data samples of English and American literature for experiment, input these data information into the Windows host, and record the specific values of relevant experimental indicators.

Choose the online learning system of British and American literature based on Android, the online learning system based on intelligent coding [12], and the online learning system based on neural network [13] as three different control methods. Use the above three methods to control the Windows host respectively. When the input amount of British and American literature data samples reaches the experimental standard, record the numerical changes of the user response rate and the stable running time of the online learning host.

Both the user response rate and the stable running time of the host can affect the application ability of the American Literature Online Learning System. Without considering other interference conditions, the faster the user response rate and the longer the

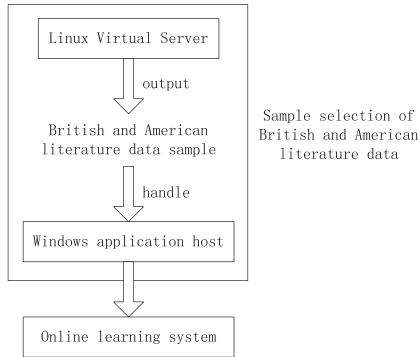


Fig. 4. Experimental principle

stable running time of the host, the stronger the application adaptability of the American Literature Online Learning System.

The following table records the numerical changes of user response rate indicators during the experiment.

Table 1. User Response Rate

Sample input of British and American Literature/ ($\times 10^9$ Mb)	Android based online learning system/ (bit/ms)	Online learning system based on intelligent coding/ (bit/ms)	Online learning system based on Neural Network/ (bit/ms)
1.0	13.5	12.7	10.4
2.0	13.8	12.7	10.6
3.0	14.1	12.7	10.8
4.0	14.6	12.7	11.0
5.0	15.0	12.7	11.3
6.0	15.3	12.7	11.3
7.0	15.6	12.7	11.3
8.0	15.8	12.7	11.2
9.0	15.9	12.7	10.9

It can be seen from Table 1 that with the increase of the input amount of British and American literature data samples, the user response rate based on the Android online learning system shows a significantly increasing trend of numerical change. By the end of the experiment, the maximum value reached 15.9 bit/ms. The user response rate under the action of the online learning system based on intelligent coding has always maintained a relatively stable numerical change trend throughout the experiment, but its numerical level is low, which is 3.2 bit/ms lower than the former. The user response rate under

the effect of the online learning system based on neural network keeps the numerical change trend of first increasing, then stabilizing, and finally shrinking. The maximum experimental result is 11.3 bit/ms, which is still far lower than the experimental result of the online learning system based on Android.

The figure below reflects the numerical changes of the stable running time of the online learning host under the action of the Android based online learning system, the intelligent coding based online learning system, and the neural network based online learning system.

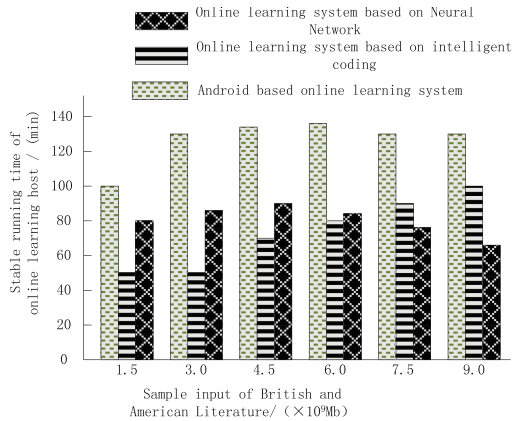


Fig. 5. Stable operation duration of online learning host

It can be seen from the analysis of Fig. 5 that when the sample input of British and American literature reaches 6.0×10^9 Mb, the stable running time of the application host based on the Android online learning system reaches the maximum of 138 min; When the input amount of British and American literature data samples reaches 9.0 Mb, the stable running time of the application host of the online learning system based on intelligent coding reaches the maximum of 100 min; When the sample input of British and American literature reaches 4.5×10^9 Mb, the stable operation duration of the online learning system based on neural network reaches the maximum of 90 min.

Based on the above experimental results, it can be seen that: the online learning system based on intelligent coding and the online learning system based on neural network are relatively weak in improving the user response rate, so these two types of systems cannot effectively maintain the operating stability of the application host in the process of users' online learning of British and American literature data; The Android based online learning system can effectively improve the user response rate, which can play a role in promoting the stability of the application host during the online learning of British and American literature data.

5 Conclusion

The study of British and American literature should include two purposes: language acquisition and cultural acquisition. From the perspective of the nature of literature, the value of using British and American literature for cultural quality education is far greater than the value of language education. British and American literature is a mirror, which reflects the history and culture of the English nation. The significance and role of British and American literature research is to deepen the knowledge learned by learners at the basic stage, enhance their understanding of western literature and culture, and improve students' pragmatic competence by reading and analyzing British and American literature works. This requires English and American literature learners to constantly strengthen their cultural awareness in order to successfully learn and use language, and in today's multicultural development, it is more conducive to improving learners' intercultural communication ability and avoiding the interference of communication barriers. Therefore, the study of English and American literature should have cultural awareness and gradually expand and deepen.

The online learning system for English and American literature based on Android allows students to independently choose the course, content, time and place of learning, and the system has the evaluation of students' learning effect. It can analyze and compare students' mastery of each course, so as to improve students' enthusiasm for learning. In addition, the system is developed using the Android system and Java technology, which can realize the client and smartphone client, It can better facilitate students' learning anytime and anywhere. This kind of learning mode is more convenient, with less energy and material resources. The application involves a wide range of contents, which can meet the needs of most people. Through performance analysis and product testing, the learning system can meet the autonomous learning needs of all kinds of people, achieve the desired goal, and has certain application value.

However, there are still many defects in the Android application system framework, such as the limitation of network bandwidth, the limited storage space and configuration of servers, and the performance of mobile terminals also determines the user experience. The system development for different learning objects, different learning needs and characteristics needs further study.

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