



Intelligent Platform for College English Blended Teaching Based on Mobile Learning

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Abstract. There is a large amount of heterogeneous data in the hybrid teaching platform, and the amount of data is large and various, resulting in low efficiency of database retrieval, which in turn affects the response time of platform query. Design an intelligent platform for college English blended teaching based on mobile learning. The hardware part adopts the combination of FPGA and CPU to realize data collection and processing, and the read-write control module sends data to the process control module to complete the read-write. In the software part, an intelligent platform software architecture is established according to teaching needs, a platform database is designed, and data is stored and accessed through relational databases and SQL. Based on mobile learning, the functional modules of the teaching software are implemented. The client directly faces the user. It receives and calculates and processes the user data, and then sends a request to the server. The test results show that the average response time of the English blended teaching intelligent platform designed in this paper is lower than that of the traditional teaching platform, and the overall cost acceleration is lower than that of other platforms.

Keywords: Mobile learning · College English · Blended teaching · Intelligent platform · Teaching platform

1 Introduction

With the rapid development of information technology, people's learning environment and learning methods are constantly enriched and improved, and various educational concepts and educational viewpoints based on the information environment are constantly emerging and innovating. College English teaching requirements include three levels, namely general requirements, higher requirements and higher requirements, and the teaching mode of English courses should also be improved. The current learning methods can no longer meet the students' learning requirements. Therefore, English needs a new learning method to meet the students' individual learning needs. Under such a wave, the combination of traditional instructional design and information technology is imperative [1].

The design and research of the intelligent platform for college English blended teaching is a powerful supplement to the current domestic research on mobile learning and

blended learning, and it also has certain practical value for blended teaching research with specific learners and subject characteristics. In the teaching of college English in the information technology environment, various information technology equipment and mobile tools play a pivotal role. At present, the information technology tools used in college English teaching include PPT manuscripts, Blackboard platform, Moodle platform, WeChat, teaching APP, etc. The use of these mobile tools is an indispensable part of realizing hybrid college English teaching. The designed and developed college English blended teaching intelligent platform can help learners use their spare time to study anytime and anywhere, which will undoubtedly bring great convenience to learners. Mobile learning platforms can provide students with rich digital learning resources, as well as good interactive functions and smooth user experience [2]. Use the mobile learning platform to combine online teaching resources with offline courses, effectively use new media technology, and make up for the lack of deep integration with the education field.

This paper designs an intelligent platform for college English blended teaching based on mobile learning. The hardware and software parts of the platform are designed respectively. The combination of FPGA and CPU is used to realize data acquisition and processing, and a read-write control module is designed to realize signal reading and writing. Design the platform database to store and access data through relational database and SQL. The realization of teaching software function modules based on mobile learning. The above design provides support for the actual teaching activity practice.

2 Hardware Design of Intelligent Platform for College English Blended Teaching

The key to the hardware part of the intelligent platform for college English blended teaching designed in this paper is to store the collected data and perform a series of subsequent processing on the stored large amount of data, so as to meet the large-capacity storage requirements of blended teaching data. This design uses a combination of FPGA and CPU to achieve data acquisition and processing, which is composed of multiple ADCs and multi-level FPGAs. The overall framework of the hardware part is shown in Fig. 1.

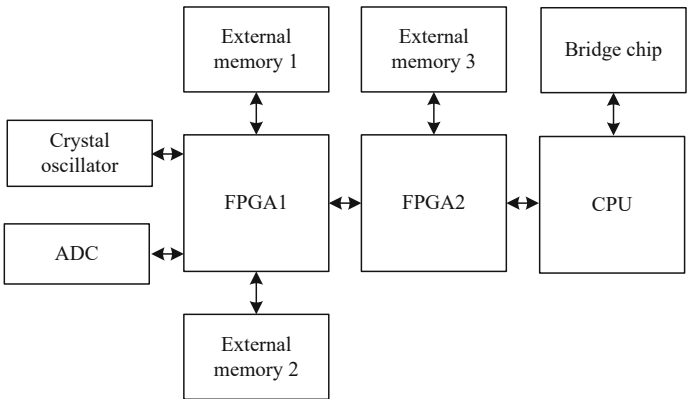


Fig. 1. Overall framework of platform hardware

As shown in Fig. 1, the externally input analog signal enters the signal conditioning channel. After proper gain and attenuation, the signal is sent to the ADC. The ADC converts the analog signal into a digital signal, and the phase-locked loop generates a sampling clock and sends it to the ADC. This design realizes the design of 10Gbps digital storage oscilloscope through four ADCs with 2.5 GSPS sampling rate and 12 bit vertical resolution. Each ADC corresponds to one acquisition channel, and the total acquisition data flow is 120 Gbps.

This platform design requires signal cross-clock domain processing. The read-write control module sends a read-write completion signal to the process control module, the process control module sends a request signal to the serial port sent by the serial port sending module, and the serial port sending module sends a serial port sending completion signal to the process control module. Since the above-mentioned signals are all pulse signals, a pulse synchronization circuit is used to complete the cross-clock domain transmission of these signals. The input of SSTL is a differential comparison circuit, as shown in Fig. 2, one end is the input and the other end is the reference voltage VHF.

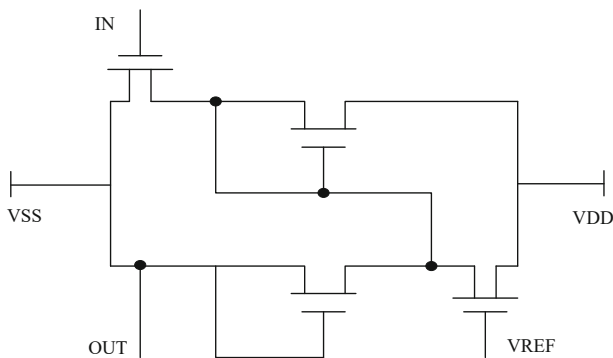


Fig. 2. SSTL interface circuit

Therefore, the input stage provides a better voltage gain and a more stable threshold voltage, which makes it more reliable for a small swing input voltage. SSTL interface can be single-ended IO, and SIO can also be differential IO. SIO uses one signal line for data transmission, and DIO uses two signal lines for data transmission. DIO can be simply understood as the splicing of two SIOs from the structure. For the high-speed mass data stream transmitted by the ADC, it is very critical to choose which logic device to receive, buffer and process. The commonly used logic devices are ASIC and FPGA. For the high-speed data stream collected by ADC, both devices have the ability to process a large number of high-speed data streams.

3 Software Design of Intelligent Platform for College English Blended Teaching

3.1 Software Architecture Design of Intelligent Platform for College English Blended Teaching

Learning is a process in which learners actively participate, and knowledge is actively constructed by learners. Combined with the characteristics of English blended teaching, the software design should take students as the main body, and give full play to students' subjective initiative. Therefore, it is required to consider enhancing students' learning flexibility when designing. Requirement analysis plays a key role in software engineering. It is the basis for design and development, and determines the functions to be implemented by the software. System requirements analysis is to answer the question of "what the system does" to ensure that the developed application can attract users and meet the needs of users. In addition, based on the characteristics of mobile learning theory, English blended teaching can connect teachers' teaching end and students' learning end through the network, teachers can upload resources at any time, and students can receive learning resources and content regardless of whether they are in the learning state [3].

According to the full consideration of the characteristics of mobile learning and the grasp of user needs, the design of the software part of the intelligent platform for college English blended teaching mainly includes two parts: client and server. In the process of UI and interaction design and development of mobile learning teaching software, it is necessary to consider the user's preference and habits during actual operation [4]. Simple and convenient interaction and user interface can play a role in promoting learning. Because the C/S architecture technology is mature and its main features are fast response and strong interactivity, the platform in this paper adopts the C/S structure. The platform software architecture design is shown in Fig. 3.

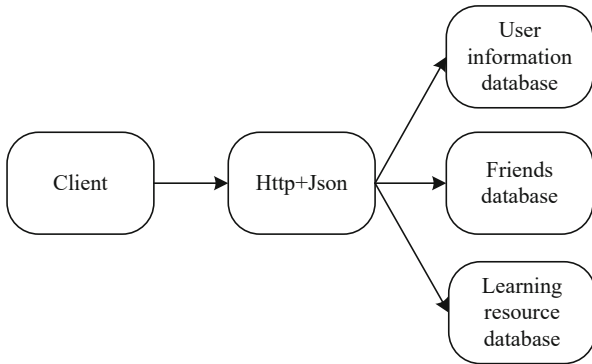


Fig. 3. Platform software architecture

The clients of the English blended teaching intelligent platform mainly include Android smart phones and other mobile devices based on the Android operating system. Users can learn English reading and check their own learning through these mobile

terminal devices. The client directly faces the user, it receives and calculates the user data, and then sends a request to the server. Knowing Cloud Server is selected this time, and Knowing Cloud provides developers with various versions of cloud server packages. Due to the low number of users in the early stage, the free developer package provided by Knowing Cloud was selected first. After the number of users grows, it can be adjusted and optimized as needed. After receiving the request sent by the client, the server can quickly obtain the response request, and the client then calculates and processes the received response and data, and finally presents the processed data to the user. The developer completes the service initialization in `app.js`. After completion, the cloud service can verify whether the current teaching intelligence platform can be accessed. After passing the verification, the teaching intelligence platform can use all the functions provided by the server. Servers include resource servers and database servers. The resource server is mainly used to store learning resources and process the interactive information of teachers and students, that is, the release of learning tasks and the question and answer of teachers and students. The module interface analyzes the use request of the function module after the user platform operation, and requests to call the data information or software function of the database in the server [5]. The server has two major functions: first, to provide data and content for the software; second, to provide teachers with resource management and data monitoring. The function of the database server is to store the personal information of the students and to check the accuracy of the information submitted by the feedback users. When using a mobile device to click to send out a module use request, the mobile teaching platform client sends it to the server, and after the service is processed, it is returned and displayed to the user. The communication protocol of the English hybrid teaching intelligent platform is the HTTP protocol. The client uses `HttpClient` to connect with the server, and the server receives data through `HttpPost`, and then uses `HttpResponse` to transmit data.

3.2 Platform Database Design

The college English blended teaching service needs to be supported by a powerful database, and has high requirements in terms of scalability. The goal of database design is to enable the software system to store relevant data according to the user's needs to achieve the user's use purpose. The problem that developers must consider is to properly design the database so that data resources can be used efficiently.

Intelligent English teaching usually involves a lot of data. In the process of platform calculation and analysis, a large amount of structured and unstructured data information will be generated. It is necessary to have enough database as support to ensure the stable operation of the platform, and the database must also carry and store this information. Part of data. In addition, the realization of functions such as storage and retrieval needs to rely on the database. The resource materials provided and pushed by teaching resources and databases can not only assist students in learning the course content, but also extend and supplement the learning content appropriately along the context of courses and themes [6]. According to the demand analysis, the database entities used in the intelligent platform for college English blended teaching are planned: student entity, administrator entity, user information entity, learning resource information entity, and task information entity. The data table of the relational database is in the form of two-dimensional table.

For the relational database, the design of the data table affects the operation efficiency of the database to a certain extent. Due to space limitations, only the smart platform user information data sheet is shown in this article. The design of the user information data table is shown in Table 1:

Table 1. User information data sheet

Serial number	Code	Name	Types of	Length
1	Username	Username	Varchar	50
2	Registration	Registration number	Int	50
3	Password	Password	Varchar	30
4	Age	Age	Int	10
5	Gender	Gender	Varchar	10
6	Mailbox	Mail	Varchar	50

The teaching resource database is composed of relevant texts, subject-related cultural knowledge, text-derived grammar, English special skills, basic English exercises, extended cultural resources, and course information notices. The interaction between teachers and students, and between students and students can be strengthened through the medium of teaching resources, allowing more information to grow and circulate in such a resource structure [7]. For unstructured data, because the field length is variable and repeatable, and the content and form are flexible and changeable, it is impossible to effectively express the data information by establishing a two-dimensional table, such as text, image, audio and other factors. Difficult to express. There is no small difference between it and structured data, both in terms of structure and semantics. In the field of application software systems, in order to improve the efficiency of distributed database query, in addition to optimizing the database system architecture according to the distributed database cluster structure, it is also possible to design a more efficient and appropriate distributed database query strategy and algorithm. The computers on each network site implement data operations through the data bus, and the computers connected to the bus can communicate with each other. The communication cost estimation formula is:

$$\chi = \chi_0 + \beta\delta \tag{1}$$

In formula (1), χ represents the communication cost incurred in the process of transmitting δ units of data from one network site to another network site; χ_0 is the time it takes to initialize communication between communication network sites once; β represents data transmission quantity. The genetic algorithm is used to optimize the distributed database query process, and the fitness function of chromosomes can be expressed as:

$$F(a) = \sum_a (\chi_0 + \beta\delta) \tag{2}$$

In formula (2), $F(a)$ represents the fitness function of a chromosome. The probability of each chromosome being selected is obtained by comparing the fitness function value of each chromosome with the sum value, as shown in formula (3):

$$\varphi(a) = \frac{F(a)}{\sum_{a=1}^m F(a)} \quad (3)$$

In formula (3), $\varphi(a)$ represents the probability of each chromosome being selected; m represents the total number of chromosomes. The database query algorithm has been improved to shorten the data query time. The platform adopts a distributed storage structure, and uses relational databases and SQL to store and access data. At the same time, reasonable arrangements are made on each computing node, which can form an effective connection with ordinary users, and users can easily access data. Upload or download, and also support the storage and access of large-scale data information.

3.3 Realization of Functional Modules of Teaching Software Based on Mobile Learning

The registration and login modules are mainly aimed at users who initially use the intelligent platform to learn, so that the background management system can obtain the user's information according to the account information, and some of the user's learning track or historical records can be well preserved. The teaching resource module is mainly used to show learners rich teaching resources related to information technology, such as documents, pictures, audio and video. Learners can search for the learning content they need in the teaching resource module (categorized by display form). For developers, no account system means that the user's information cannot be obtained. It is difficult to make further decisions based on some basic information of the user, and some historical records of the user cannot be well preserved. The teaching module is equipped with a search function, and learners can also fill in the text related to the desired content through the search bar to search, and there are extended resources, such as audio, video and other resources, to improve learners' interest in learning about information technology. Through background management, managers can update teaching resources in a timely manner and provide a convenient way for learners to obtain rich teaching resources. After the English mixed teaching intelligent platform is launched, it will directly enter the registration and login interface. If the user has already registered the intelligent platform, he can directly enter his user name and password on the login interface to log in.

The after-class answering module is used to answer the practice questions provided by the after-class practice module after learning through the mobile learning platform, corresponding to the knowledge learned. Short answer questions etc. While learning knowledge to expand the amount of reading and pageviews, it is also necessary to pass a certain practice test, so that you can intuitively understand the solidity of the learner's content, so as to fill in the gaps, guide the learner's learning in time, and help the learning. Develop good practice and study habits. The learning module is divided into three parts: course recommendation, latest recommendation and vocabulary learning.

In the course recommendation part, the latest online courses related to English learning are mainly recommended to learners; in the latest recommendation part, the detailed explanation and answering skills of English test-related questions are mainly recommended to learners; in the vocabulary learning part, learners are mainly provided with vocabulary classification learning, and provides phonetic transcription, pronunciation and example sentences of related words. After the learner submits the test paper, the system will automatically give the score and the number of correct answers, and also provide the correct answer and answer analysis for each question to help learners better understand their mastery of knowledge. Managers can analyze the overall answer data of learners, and after communicating with teachers, they can delete and update existing practice questions to provide learners with better and more suitable practice questions. The tool module mainly provides learners with vocabulary query function, unfamiliar vocabulary collection function, self-test function and contact us. The vocabulary query function can facilitate learners to query related English vocabulary and obtain relevant Chinese definitions, phonetic symbols, pronunciations and related example sentences; the vocabulary collection function allows learners to add unfamiliar vocabulary to the new vocabulary book during vocabulary learning.

Compared with traditional teaching forms, mobile learning platforms cannot enable teachers and learners to communicate face-to-face. The interactive platform module is provided as a small forum, which is mainly used for learners to ask questions about the difficulties encountered in the learning process. They can also express their own thoughts on the content published in the forum. After the publication, other learners can comment on it. The district receives information, and also expresses its own opinions and exchanges in this way. The self-test function can test the learners' vocabulary learning effect accordingly; if the learners encounter related problems when using this research platform, they can use the contact us function to send the problems to the corresponding mailboxes, and the system staff will help the users as soon as possible. Solve the problem. Then the client will send the user's login request to the server, which will verify the login information. If the server returns a pass, the user can enter the homepage of the smart platform. In addition, after the learners publish their own remarks, if the questions raised are resolved or they feel that the remarks are inappropriate, they can delete them by themselves or contact the administrator to delete them, but they have no right to the remarks made by other learners. Deleted, but can be viewed, liked and commented on. So far, the design of the intelligent platform for college English blended teaching based on mobile learning has been completed. The software flow of the intelligent platform for college English blended teaching based on mobile learning is shown in Fig. 4:

4 Experimental Studies

4.1 Experiment Preparation

In this test experiment, a total of 6 devices including client, data service module server, application server and database server are used to form a distributed database cluster. The experimental hardware test environment is as follows: CPU: Intel(R) Core(TM) i7-7700HQ @ 2.80 GHz 4 cores and 8 threads; Memory: 16G DDR4. In this experiment, the client is the machine used by the user when the user requests data through the

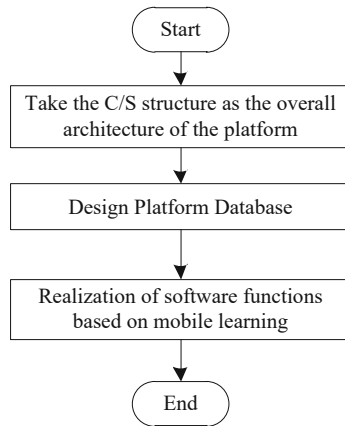


Fig. 4. The software process of the intelligent platform for college English blended teaching

browser; the data report module application program is deployed on the application server, which is responsible for receiving user requests, requesting data from the data service module, and then processing the data further, and then returned to the user. This study chose JavaScript as the development language. The Javascript code of the logic layer is running In X5 JSCore, the view layer is rendered by X5 based on the Mobile Chrome 57 kernel. The data service module receives the SQL statement of the application module, optimizes the SQL query plan, then queries the underlying database, integrates the data and returns it to the application.

4.2 Results and Analysis

According to the actual test environment built, the intelligent platform for college English blended teaching based on mobile learning is tested. Set the index data volume of the platform to 10,000, 100,000, 1,000,000 and 10,000,000 respectively, and count the average response time of students to the teaching data query page of the intelligent platform as a test indicator. The performance test results of the mobile learning college English blended teaching intelligent platform are compared with the college English blended teaching intelligent platform based on cloud computing and data mining. Tables 2, 3, 4 and 5 shows the comparative test results of the response time of each teaching platform under different data amounts.

In the index query of 10,000 data, the average response time of the mobile learning-based college English blended teaching intelligent platform is 200.52 ms, which is 175.71 ms and 192.11 ms lower than the cloud computing and data mining-based college English blended teaching intelligent platforms.

In the index query of 100,000 data, the average response time of the mobile learning-based college English blended teaching intelligent platform is 294.76 ms, which is 190.08 ms and 211.38 ms lower than the cloud computing and data mining-based college English blended teaching intelligent platform.

In the index query of 1 million data, the average response time of the mobile learning-based college English blended teaching intelligent platform is 423.51 ms, which is

Table 2. Response time comparison of 10,000 data (ms)

Testing frequency	Intelligent platform for college English blended teaching based on mobile learning	Intelligent platform for college English blended teaching based on cloud computing	Intelligent platform for college English blended teaching based on data mining
1	191.66	358.62	363.02
2	203.88	374.82	385.48
3	186.55	385.55	398.84
4	188.21	370.48	372.67
5	196.10	402.10	366.26
6	195.42	389.26	382.55
7	214.85	367.53	414.92
8	203.53	348.92	408.39
9	208.26	369.41	421.63
10	216.69	395.63	412.56

Table 3. Response time comparison of 100,000 data (ms)

Testing frequency	Intelligent platform for college English blended teaching based on mobile learning	Intelligent platform for college English blended teaching based on cloud computing	Intelligent platform for college English blended teaching based on data mining
1	289.43	469.67	496.45
2	285.65	482.47	508.29
3	276.27	495.76	482.63
4	294.01	473.18	493.17
5	298.50	468.05	505.43
6	301.86	497.81	517.42
7	304.35	486.39	504.51
8	298.48	493.24	512.06
9	296.92	488.32	523.27
10	302.12	493.53	518.19

282.38 ms and 306.74 ms lower than the cloud computing and data mining-based college English blended teaching intelligent platform.

In the index query of 10 million data, the average response time of the mobile learning-based college English blended teaching intelligent platform is 656.49 ms, which is 426.77 ms and 474.46 ms lower than the cloud computing and data mining-based

Table 4. Response time comparison of 1 million data (ms)

Testing frequency	Intelligent platform for college English blended teaching based on mobile learning	Intelligent platform for college English blended teaching based on cloud computing	Intelligent platform for college English blended teaching based on data mining
1	419.73	683.97	692.47
2	408.48	696.68	724.84
3	425.84	678.06	715.68
4	416.67	682.53	721.26
5	435.21	695.86	736.55
6	427.55	727.44	769.91
7	414.86	734.19	755.64
8	428.12	721.65	746.38
9	432.08	710.38	734.56
10	426.60	728.09	705.23

Table 5. Response time comparison of 10 million data (ms)

Testing frequency	Intelligent platform for college English blended teaching based on mobile learning	Intelligent platform for college English blended teaching based on cloud computing	Intelligent platform for college English blended teaching based on data mining
1	658.86	1012.46	1039.46
2	663.47	1008.18	1065.65
3	674.18	1026.80	1186.87
4	687.53	1036.55	1057.54
5	651.67	1128.28	1224.21
6	642.58	1214.64	1148.15
7	650.86	1207.37	1072.42
8	635.29	1056.85	1255.06
9	648.38	1049.28	1226.28
10	652.04	1092.19	1033.82

college English blended teaching intelligent platform. It can be seen from the above results that as the amount of data increases, the transmission overhead increases, and the response time of each teaching platform increases. The average response time of the English blended teaching intelligent platform designed in this paper is lower than that of the traditional teaching platform, and the overall cost speed is lower than that

of other platforms. Therefore, the platform designed in this paper improves the query performance of data under multi-threading.

On this basis, compared with the intelligent platform for college English teaching based on cloud computing and data mining, the query accuracy of the three methods for college English teaching resources was tested. The experimental results are shown in Fig. 5:

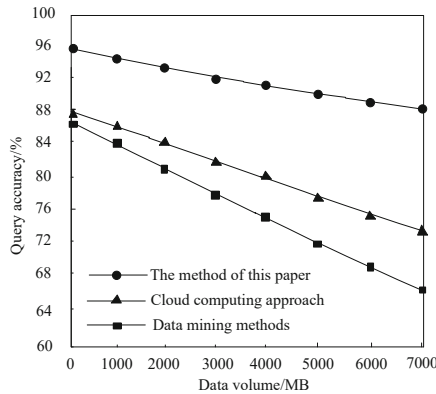


Fig. 5. The query accuracy of college english teaching resources

Analysis of Fig. 5 shows that the method in this paper has a high query accuracy for college English teaching resources, up to 96%, which is much higher than the other two comparison methods. It can be seen that this paper designs a college English blended teaching intelligence based on mobile learning. Platform performance is excellent.

5 Conclusion

With the rapid development of information technology, college English teaching is no longer traditional classroom teaching, because it is impossible for students to acquire English knowledge only through classroom reading teaching in schools. Students need to learn English reading anytime and anywhere according to their own conditions. This paper designs an intelligent platform for college English blended teaching based on mobile learning. The experimental results show that the platform can reduce the average response time of data query and has good performance.

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