



Construction of Mobile Education Platform for Piano Tuning Course Based on LogicPro Software

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Abstract. In view of the problems of the current existing mobile education platform for piano tuning course in practical application, such as the poor practicability of the platform, the inability to ensure the smooth use of various functions, the long response time of the platform operation, and the inability to meet the requirements of users for high operating efficiency of the platform, LogicPro software was introduced to carry out the research on the construction of the mobile education platform for piano tuning course based on LogicPro software. First, the B/S architecture is taken as the core to design the overall structure of the platform. Secondly, complete the selection of the platform core switches, servers and other equipment, and realize the hardware design of the platform. Under the support of LogicPro software, optimize the upload of piano tuning teaching resources. Finally, through the application of mobile intelligent terminal equipment, the mobile time teaching of piano tuning course is realized. The experimental results prove that the new education platform can complete various tasks as expected in practical application, and has high practicability. At the same time, the platform has shorter operating response time, faster operating efficiency, and can achieve higher quality mobile education of piano tuning courses.

Keywords: Logicpro Software · Curriculum · Education Platform · Moving · Piano Tuning

1 Introduction

Piano tuning is an indispensable part of piano art. All piano players take a musical instrument with accurate melody and perfect sound as the premise of their artistic exertion. This is the basic principle that almost all people engaged in musical instrument playing know, and it is also the first step of their artistic pursuit. Behind the impressive sound of the piano, there is a hard discipline, namely the technology of tuning the sound of this big machine [1]. Therefore, the development and perfection of this subject is almost the premise of the development and perfection of piano art. This art was gradually established and developed since the reform and opening up in the 1980s. It was included in the curriculum of higher professional art schools, but it came too late.

“The modern piano was born in Europe in 1709.” There are more than 220 strings and more than 8000 parts and keys inside the piano, which need the chord shaft, shaft plate and iron bone to tighten the strings. During the playing process, 88 sounds are made by hammer impact. Long term impact will cause the strings to loosen. As time goes by, the piano “runs out of tune” is an inevitable phenomenon. Not only that, the piano is mainly composed of wooden parts and metal materials, so it will be affected by temperature and humidity, resulting in inaccurate melody. Therefore, any piano in the world needs to be tuned regularly to ensure that the piano always keeps its best state. Modern piano has a history of more than 300 years. “Piano tuning has developed with the development of piano. As an independent technology and discipline, piano tuning has also existed for more than a century. It is documented that piano tuning started in Britain, and the British Piano Tuning Association was founded in 1913.” Before the 19th century, the piano was generally owned by aristocrats. After the 19th century, the piano began to become popular, The increasing demand of ordinary families for piano has a direct impact on the demand for transfer lawyers.

Network teaching platform can enhance the openness of teaching space and enrich teaching resources to a certain extent. With its flexible teaching methods and convenient interactive teaching behavior, it has become one of the main ways of teaching application at present. Among them, the stability of the network teaching platform directly affects the overall teaching effect, and the real-time data transmission plays an important role in students’ learning experience in class. Therefore, it is of great significance to ensure the stability of the long-term operation of the teaching platform and improve the real-time performance of data transmission.

Reference [2] established a teaching platform based on Hadoop cloud computing. Combining overall learning algorithms and statistical models. Calculate data scale. Hadoop cloud computing is used to integrate the Autocorrelation computing model to achieve efficient teaching platform research data processing. Simulate different operating conditions multiple times on the Hadoop platform to verify the accuracy of training capabilities. Utilize Hadoop based cloud computing to develop computing system performance and improve teaching platform research models. Reference [3] proposes an exploratory evaluation student learning system based on artificial intelligence, which enhances interactive learning experiences in nonlinear environments. Use concept mapping in Chatbot to improve students’ learning ability. In addition, based on probability distribution analysis, students were validated through concept mapping, and their learning was evaluated using the system generated probability graph curve. However, the above methods have a slower response speed when there are many concurrent users.

LogicPro software is a music production software developed by Apple, which has the functions of composition, recording, editing, sound correction and mixing. The software has a large number of plug-ins and sound effects, and is a rich sound resource library. It is easy to input, store and change notes [4] with a mouse or an external MIDI keyboard. The input note signal can be used as a trigger to flexibly trigger various voices. Notes can be presented in multiple forms such as MIDI signal bar, staff, chord mark, etc.

The memory of piano tuning needs the cooperation of the player’s hearing, vision and touch. Research shows that the human body can remember 15% of the content by hearing alone, 25% by vision alone, but 65% by combining hearing and vision. This software can

fully mobilize the joint effect of multiple senses such as hearing, vision and touch, help students experience the actual sound effect of chord and melody matching, accurately understand and remember the structure of chord, and directly link the distance between chord sounds displayed on the computer screen with the distance between fingers when playing by themselves [5]. Through the synergy of multi-dimensional senses, improve the effectiveness of students' understanding and mastering knowledge points. Based on this, this paper will carry out the research on the construction of mobile education platform for piano tuning course based on LogicPro software.

2 Construction of Mobile Education Platform for Piano Tuning Course Based on LogicPro Software

2.1 Overall Structural Design of the Platform

Based on the above analysis, in terms of building the teaching platform, this paper creates a B/S architecture based on the above analysis. In terms of building the teaching platform, this paper creates a B/S architecture based piano tuning course teaching platform that uses the burst transmission mode to optimize the upload speed of teaching resources [6]. The platform covers information management, teaching management and user information management of piano tuning courses, and serves students to learn piano tuning skills from different aspects. The application of Logic Pro software can not only enhance the integration of harmony theory and actual tuning, but also optimize the teaching quality of piano tuning courses to the greatest extent while practicing listening, and provide sufficient conditions for students to effectively practice piano tuning.

The mobile education platform for the traditional piano tuning course has poor stability, and its teaching management function is not applicable. To solve this problem, this paper uses the B/S (Browser) Server, browser/server mode) structure to create a mobile teaching platform for piano tuning courses, which greatly improves the teaching level of piano tuning courses [7]. The platform covers three layers of architecture: presentation layer, business logic layer, and data access layer. The platform architecture is shown in Fig. 1.

The presentation layer is responsible for visual interface operation, allowing users to input their own information and transmit it to the background, outputting information requests, and realizing data sharing. It is the bridge between users and the platform.

The business logic layer is the key of the whole platform, which can realize the management function of the whole platform [8]. Encapsulate various function points to form atomic function points, so that the presentation layer can mobilize the information required by users. This layer includes three parts, namely, the information management part of the law regulation course, the teaching management part and the user information management part. Among them, the tuning course information management section can manage the piano tracks, such as adding new tuning course track information, deleting information, modifying information, querying specific information, playing tracks, etc. In the platform, only teachers have operation permissions for adding, deleting and modifying track information. Querying tracks is an operation permission item [9] that everyone using the platform has. Teaching management is an important part of the platform. After users click on the platform to enter the teaching management page, they

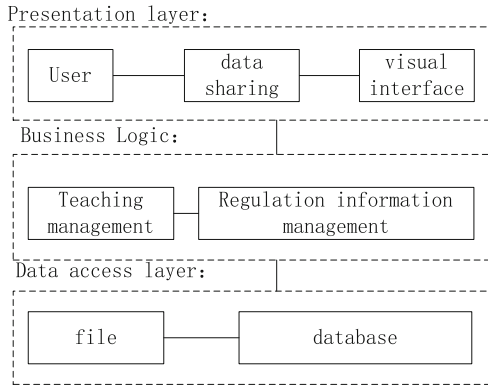


Fig. 1. Overall Structure Design of Platform

will conduct corresponding course management. Each sub module also covers different functions. The user information management section can uniformly manage the users in the platform and complete the platform operation and maintenance tasks. Only after the platform administrator’s account is logged in, can you click from the main page of the platform to enter the user management page to complete user management, such as adding users, selecting designated users, modifying permissions, etc.

The data access layer is the entrance to access files and databases, which can be called by the business logic layer to complete the functions of querying, inserting, updating and deleting the piano tuning course resource data table.

2.2 Platform Hardware Design

The network construction of the mobile education platform for piano tuning course covers two aspects: the construction of the campus internal LAN and the construction of the WAN for teachers and students outside the campus. Figure 2 is the schematic diagram of the platform hardware connection structure.

The core switch selected in the platform is TP-LINK TL-SH5210PB 10 Gigabit uplink layer 3 network management PoE switch. The power consumption of the switch is 375W; RJ45 port is 8 * 2.5GE; Product size 440 × two hundred and twenty × 44 mm; The storage temperature is within the range of -40 °C-70 °C;T he working temperature is within the range of 0 °C-40 °C;The storage humidity is 5%-90% RH without condensation; The input power supply is 220VAC, 50 Hz [10]. TL-SH5210PB is a new 5-series 10 Gigabit uplink three-layer network management POE switch developed and launched by TP-LINK. It uses a new generation of high-performance hardware and software platform, provides flexible 2.5 G access and cost-effective 10 Gigabit uplink ports, and eight 2.5 G RJ45 ports support IEEE 802.3bt/at/af standard POE power supply. The maximum POE output power of the whole machine reaches 375 W. The device also supports three-layer routing protocol, complete security protection mechanism, perfect ACL/QoS policy and rich VLAN functions, which is easy to manage and maintain, and can meet the POE networking requirements of campus and enterprise campus [11]. TL-SH5210PB provides eight 100 M/1000 M/2.5 Gbps RJ45 ports and two 1 G/10 Gbps

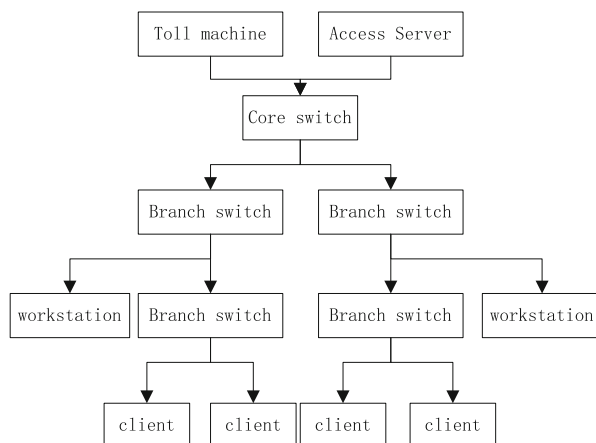


Fig. 2. Schematic diagram of platform hardware connection structure

SFP+ports. All ports support the wire speed forwarding function, which can easily meet the high-speed access requirements of terminal equipment such as WIFI 6 APs.

The SR868-460 type server is selected as the access server in the platform. The performance indicators of this type of access server are shown in Table 1.

Table 1. Access server performance indicators

S/N	performance index	numerical value
(1)	processor	Two or four second-generation Intel Xeon expandable processor platinum series, up to 205 W
(2)	Memory	Up to 6TB in 48 slots, using 128 GB DIMMs; 2666 MHz/2933 MHz (planned support) TruDDR4
(3)	Hard disk	Up to 24 2.5 inch storage bays supporting SAS/SATAHDD and SSDs, or 8 2.5 inch NVMe SSDs; And 2 images supporting startup M.2
(4)	network	Multiple options of 1 GbE, 10 GbE, 25 GbE, 32 GbE, 40 GbE or InfiniBand PCIe adapters are provided;1 (2/4 ports) GbE or 10GbE LOM card
(5)	Power Supply	2 hot pluggable/redundant: 750 W/1100 W/1600 W/2000AC 80 PLUS platinum power supply
(6)	RAID	Hardware RAID (16 ports at most), with flash memory cache; Up to 16 port HBAs

In the LAN, access to the mobile education platform for piano tuning courses can complete piano teaching, query and play teaching tracks, personnel management, etc. The online access platform for teachers and students on campus provides real-time homework upload, accompaniment download, online interaction, etc. At the same time,

teachers and students outside the school can also use the network access platform to complete the same access operations as users inside the school.

2.3 Upload of Piano Tuning Teaching Resources Based on LogicPro Software

Logic Pro software can visually present the pitch, time value and strength of the notes through the MIDI signal bar in the piano shutter window, so that the three important musical elements can be visualized. After playing, the player can not only selectively replay the sound of the played music segment, but also clearly see the time value and strength of the played notes through the length and color of the MIDI signal bar [12]. The playing force is clearly distinguished by the multi-level gradient colors from green to red in the software, and is automatically quantified into numbers: the playing time value can be quantified to half a beat, quarter a beat, or even smaller time value units in the software through the enlarged grid in the piano shutter window. The quantification of strength and time value can help students fully understand the advantages and disadvantages of their own playing, and understand the gap between their own playing strength and time value and ideal playing effect, so as to effectively set short-term goals and improve practice efficiency. The synergy of touch, vision and hearing promotes the player's perception of musical elements such as chord structure, time value and strength.

Logic Pro software can input sound parts separately in separate tracks, and output or play one or more sound parts in combination. The sound source library provided with the software not only contains complete symphony, folk music, and electronic music timbres, but also can be implanted into other external sound sources to fully meet the user's auditory needs, achieve a richer auditory experience from the combination of musical instrument timbres, and intuitively show the sound effects when melodies appear independently or in combination. In teaching practice, the author found that when listening to the timbre of national instruments, students majoring in folk music have a higher recognition of single melody and chord than western orchestras; On the contrary, when listening to the performance of western orchestral instruments, students majoring in western music also have better recognition of single melody and chord than listening to folk music. Therefore, the author believes that in playing practice, students can set the music track as the type of instrument they are familiar with, for example, the students majoring in folk music set the melody track as bamboo flute, and the tuning course track as dulcimer. This rich and varied listening experience can not only enhance students' understanding and memory of the musical expression of chords, but also stimulate students' subjective initiative to try to create independently.

Hypothesis $x(t)$ is the transmission signal in the platform, $h(t)$ is the platform shock response function, $n(t)$ represents the Gaussian noise signal with an average value of 0 and a variance of 1. The received signal of the platform is recorded as:

$$y(t) = h(t)x(t) + n(t) \quad (1)$$

In the formula, $y(t)$ Indicates that the platform receives signals.

According to Shannon's theory, the platform channel capacity is:

$$C = \lg(1 + \rho v) \quad (2)$$

In the formula, v indicates the average signal power in the transmission period; ρ indicates the channel gain; C indicates the platform channel capacity. If the resource uploader can accurately obtain the quantization value of ρ , the platform will divide ρ into K quantization levels and define the quantity range as Ω_i . Set in sequence s_i, v_i is the quantitative range i effective transmission time and power, then the average expression of transmission rate is:

$$E(R) = \sum s_i \lg(1 + \rho v_i) \quad (3)$$

In the formula, $E(R)$ indicates the transmission rate.

The upload rate optimization of piano tuning course resources includes short-term power constraints and long-term power constraints. In the short-term power constraint, if it is in the period T , total power is P_c , power loss $P < P_c$, the constraint is transformed into:

$$s_i(v_i + \sigma) = P_c \forall i \in \{1, 2, \dots, K\} \quad (4)$$

In the formula, σ represents the optimized upload rate of piano tuning course resources under short-term power constraints.

To get the best set ρ_i , calculated the Partial derivative of $E(R)$ to ρ_i , let the derivative be 0, and determine the best value $F(\rho_i + 1)$ of $F(\rho_i)$:

$$F(\rho_i + 1) = F(\rho_i) + \frac{s_i \lg(1 + \rho_i)}{\lg(1 + v_i \rho_i)} \quad (5)$$

Long term power constraints should be clear ρ_i and v_i . Ignoring the power condition, the long-term power constraints are transformed into two sub optimization problems. Hypothesis v_i in any known set, find a local optimal quantization boundary set ρ_i , through boundary set by water injection method ρ_i get the local optimal power distribution value of v_i . Under the premise of considering the calculated power, the alternative minimization method is used to clarify the power meter at the resource input and the calculation scheme under the constraint of the calculated power.

The power loss in the global resource transmission period is limited, and only the average power constraint is required to meet the conditions. If the power loss of a part of the quantization range is higher than the constrained power P_c , the following formula is obtained:

$$\sum_{i=1} (s_i P_i) \leq P_c \quad (6)$$

In the formula, P_i indicates assigned to quantification range of power Ω_i .

Use β All index sets representing the quantitative range of burst transmission, then the objective function is further obtained. set up λ And $\{\lambda_i\}$ As a nonnegative Lagrange multiplier Q The expression of the objective function is:

$$Q = \sum_{i \in \beta} s_i \lg(1 + v_i \rho_i) + \sum_{i \in \beta} \lg[1 + \rho_i (P_i - \sigma)] \quad (7)$$

Solve the partial derivative of the above formula in set β . If $i \in \beta$, the transmission rate of piano tuning course resources meets the requirements. For the sudden transmission range in the teaching platform of piano tuning course, in order to eliminate the dual gap, the value P_i must be equal to 0 to prevent the problem of poor stability caused by the uneven distribution of power, so as to ensure the long-term stable operation of the teaching platform.

In the specific teaching practice, the following exercise steps can be used: in the piano tuning exercise, students can create two independent tracks, one for melody and the other for accompaniment, every time they finish improvisation with melody. Copy the melody MIDI signal bar in the first playing track to the new melody track, and then copy the accompaniment MIDI signal bar to the new tuning course track. When the melody and accompaniment are assigned to two different tracks, the timbre of the melody track can be arbitrarily changed to any other instrument, so that the timbre of the main melody voice part and the accompaniment voice part can be completely distinguished audibly, and the actual sound effect of the piano in the process of tuning can be felt. By changing the combination of musical instruments, a rich and varied auditory experience can be achieved. In the practice of melody free tuning, you can play the input melody part first and convert it into any suitable instrument timbre. While playing the melody part, play the melody free melody with both hands on the piano melody track. Through the simultaneous presentation of three voice parts, a more real-time, three-dimensional, realistic auditory perception can be achieved. Both of the above two methods have improved the drawbacks of boring and repetitive traditional exercises, increased students' interest in learning, and are beneficial to the improvement of practice effect. According to the law of sensory synergy, multiple senses work together on memory activities, which is far more effective than using a single sense alone. Logic Pro software can fully mobilize students' multiple sensory experiences, thus promoting the understanding and memory of knowledge, effectively making up for the shortcomings of the traditional teaching of theoretical harmony and keyboard harmony teaching that can not be effectively combined, and the theory and practice are disconnected, and achieving better teaching results than the traditional classroom repeated exercises using a single sense.

2.4 Mobile Education of Piano Tuning Course

The mobile intelligent terminal equipment is regarded as the necessary condition for realizing the mobile education of piano tuning course. Apply the platform software and programs designed above to the mobile intelligent terminal equipment [13, 14], and realize the connection between the mobile intelligent terminal equipment and the above platform hardware through WiFi, 4 G, 5 G and other communication networks. Learners can use mobile devices to log in to the platform anytime and anywhere for learning, which is of great significance for lifelong learning. Based on the operating characteristics of the mobile education platform for piano tuning courses and the needs of mobile learning, the following principles should be considered in the design of the mobile online education platform: first, friendly interface and simple operation; Second, good scalability and compatibility; Third, the main function of the mobile intelligent terminal device is to answer and make calls. The device application software should have the function of pausing, saving data or exiting when calling.

There are two development schemes for mobile front-end. The first is to use the browser as the sea client; The second is to develop client application software. The comparison between the two schemes is as follows: the first scheme can install the browser directly, but because the screen of the mobile terminal device is too small, the performance effect is affected and the interface jump is not very convenient. Moreover, due to the limited function of the browser, it is unable to provide various multimedia interactive learning capabilities in the online education platform. The second solution needs to develop front-end application software, but it can be customized to provide more complex interaction of various audio and video streams, so that learners can learn more easily and improve the learning effect.

According to the above analysis, the mobile education platform for piano tuning course designed in this paper uses B/C mode, the front-end, that is, the client, uses the way of developing application software, and the back-end uses the server. In order to make the system have good scalability and maintainability, the platform uses MVC mode to develop.

The client communicates with the server using HTTP protocol, and the data communication format is XML or JSON. The connection between the front end and the rear end uses the `URLConnection` or `HtoClient` class. This connection is an important process of returning data from the server, and can obtain the `InputStream` byte stream object. The main advantage of `URLConnection` is multi-threaded breakpoint upload and download, while the functions of `HttpClient` are more extensive. The server column intercepts the client's URL request and parses it, then obtains the data through `HttpPost`, generates XML or SON format data, returns it to the client using `HttpResponse`, converts it through `nputStreamReader`, and displays the returned data using `BufferedReader`.

In order to ensure the smooth implementation of mobile education of piano tuning course, it is necessary to reserve sufficient educational resources and establish a mobile education database. First of all, we should establish a sub database of student education progress and each flow record to associate with identity information. The teacher sub database includes mobile phone number, alias, grade, student comments and remarks, including text real-time dialogue, related video text introduction, teaching time, teaching students (mobile phone number), teaching content coding, related videos, and current education evaluation.

The student sub database includes mobile phone number, alias, grade, teacher comments and notes, including real-time text dialogue, teaching time, teacher (mobile phone number), relevant education videos, and current education evaluation. The above two sub databases are used to record the content of one-on-one education information. The level content is refreshed according to the platform evaluation system calculated for each evaluation.

Establish the information database of each teacher's teaching content and schedule, which shall be edited by the teacher [15]. The next step is to select the time period and teaching content of the teacher. After the deposit is selected, the teacher's schedule can be selected by a student. Once the deposit is selected, other students can only see the unselected time period and select it. Once the students have chosen to pay the deposit, the teachers and students will enter a pair of continuous broadcast rooms directly according to the time agreement.

The mobile education of piano tuning course needs to build related technologies, including optical lens design, education server platform technology and terminal APP video service programming. Piano atlas preparation, photo file, put in the cloud disk shared directory, steel.

Piano track is to sort the file names and enter them into the piano knowledge base and sub base. If you omit the knowledge base and sub base, you can also directly call the file in the shared directory to call the music score file. Rent video cloud services from video service companies, such as establishing video connection services with Baidu, Tencent and Alibaba Cloud servers. The standard length of the piano lens is 1.5 m. Add a large field of view corner lens to the front lens of Ipad, and the lens can see 1.5–2 m. Put it on the piano spectrum shelf, you can see all the keys of the piano.

Write an app to transmit some videos of the piano key rotating in the video area in real time. According to the difference between the lens type and the display area, video processing needs to be performed again.

Write app programs to solve video rotation, up, down, left, right, video area selection function to adapt to the types of shots in various programs. Take the vertical placement of Ipad as an example. The upper (or lower) 1/5 area is used as the video area to display fingering, the lower 4/5 area (or upper) is used as the music score area, and the four corners of the video area can be marked with specific signs to indicate the direction status of the piano key video. Pairing practice requires pointing guidance in the same direction. When rotating the video, you should know whether your rotation is in the same direction or in the opposite direction.

According to the above settings, the teaching content of pre job regulation course can be more clearly displayed in the mobile intelligent terminal equipment, and the quality of mobile education can be improved.

3 Experimental Analysis

3.1 Experiment Preparation

In order to verify the practicability of the platform, the function and performance of the platform were simulated and tested. The stability of the designed platform is verified through different functional tests. Functional testing is to use test cases to verify the platform functions. In order to make the experimental results comparable, the education platform based on LogicPro software designed above in this paper is selected as the experimental group, the education platform based on education cloud is selected as the control group I, and the education platform based on big data is selected as the control group II. First, we tested the three management functions of the platform, and uploaded the attachment by selecting the tune exercise track; Modify a certain information in the tuning exercise track, and observe whether the modified information can be saved; Check whether the style can be deleted accurately; Check whether the music can be played quickly. The above four tests are used to test the information management function of modulation. On this basis, by judging whether the three education platforms can correctly find the required courseware; Whether to query the number of users effectively; Can you use keywords to browse jobs; Whether this function can be used to complete online problem solving and test the teaching management function of the course.

After testing the platform functions, use Loadrunner 9.5 to complete the performance simulation experiment for the running performance of the three education platforms, and use 300 concurrent virtual users to query at the same time to test the platform response time and throughput.

3.2 Result Analysis

Taking accompaniment information management and teaching management as an example, functional tests were carried out on two modules, and the results are shown in Tables 2 and 3.

Table 2. Test table of three platforms' regulation information management function

S/N	Test items	Results of experimental group	Results of control group I	Results of control group II
(1)	Uploading the information of tuning practice	adopt	adopt	Failed
(2)	Modify the tuning exercise information	adopt	Failed	adopt
(3)	Delete tuning practice information	adopt	Failed	Failed
(4)	Play the tune exercise track	adopt	adopt	adopt

Table 3. Test Table of Teaching Management Functions of Three Platform Regulating Courses

S/N	Test items	Results of experimental group	Results of control group I	Results of control group II
(1)	Courseware management	adopt	adopt	Failed
(2)	user management	adopt	adopt	adopt
(3)	job management	adopt	Failed	adopt
(4)	Online interaction	adopt	Failed	Failed

According to the results of various functional tests recorded in Tables 1 and 2, during the operation of the data function of the education platform based on LogicPro software

proposed in this paper, the client has relatively complete verification actions. Without going through the server, the client can complete reliable information type calibration, prevent the input of dirty data, and ensure the quality of platform teaching resources, After inputting the complete piano improvisation accompaniment information, it can be quickly saved to the database, and the test results meet the expected goals. However, the other two education platforms fail to pass a test item in the application process, which cannot meet the actual needs of users.

According to the above experimental results, the data application of the education platform based on LogicPro software in this paper is more practical. On this basis, the operating performance of the three education platforms is compared with the results of the platform response time test. The response time test results of the three education platforms are shown in Figs. 3, 4 and 5.

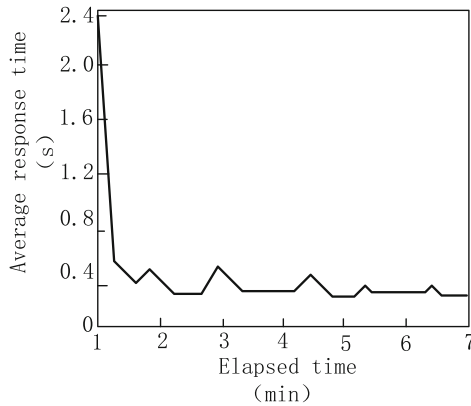


Fig. 3. Response time test results of the experimental group's education platform

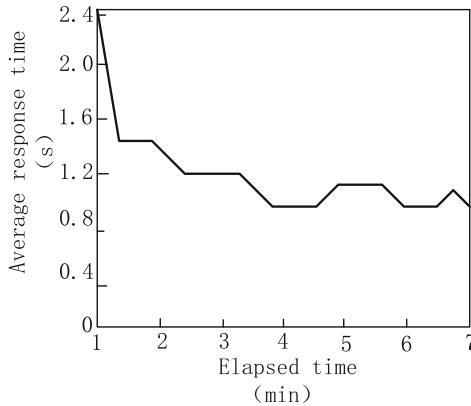


Fig. 4. Response Time Test Results of Group I Education Platform

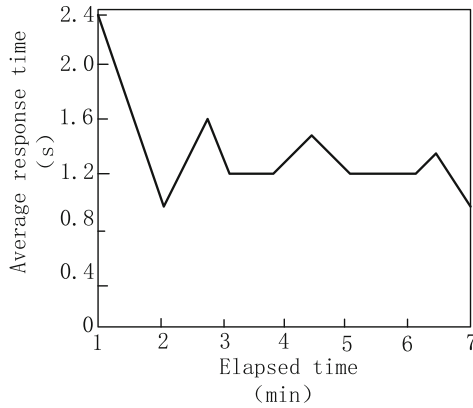


Fig. 5. Response Time Test Results of Group II Education Platform

By comparing the response time of the above three education platforms in the application process, it can be concluded that the average response time of the education platform platform in the experimental group is 0.384 s, the maximum response time is 2.398 s, and the minimum response time is 0.312 s under the condition of 300 concurrent virtual users. In general, when 300 concurrent users access, the average response time can meet the design goal within 1s, while the platform in this paper can meet the operational performance requirements within 1s, indicating the superiority of the actual application of the platform. The maximum response time of the other two education platforms is close to that of the education platform in this paper, but their minimum response time cannot reach the level of the experimental group, and the average response time cannot be controlled within 1s, which cannot meet the user's access requirements. Therefore, the above experimental results can prove that the education platform based on LogicPro software proposed in this paper has stronger practicability in practical applications, and the platform has good operational response performance, which can fully meet the needs of platform users.

Comparing the throughput of different platforms, the higher the throughput, the better the stability of the platform. The throughput comparison of different platforms is shown in Fig. 6.

From Fig. 6, it can be seen that Control Group I reached its maximum throughput of 135 bit/s in 7 s, while Control Group II reached its maximum throughput of 140 bit/s in 6.5 s, both of which showed a significant decrease. The maximum throughput of the experimental group is 149 bit/s, which is greater than the other two platforms. After reaching the maximum throughput, the throughput of the experimental group remains at a certain level, indicating that the processing ability of the experimental group is strong.

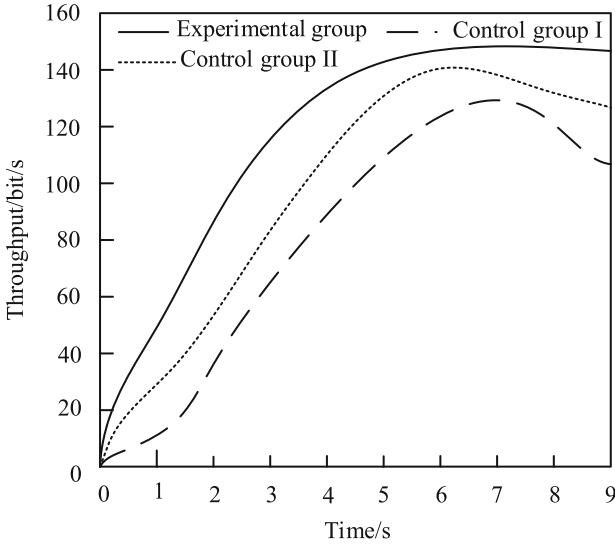


Fig. 6. Comparison of Throughput on Different Platforms

4 Conclusion

In order to improve the stability of the mobile education platform for piano tuning course and improve the teaching quality of the network platform, a mobile education platform for piano tuning course based on Logic Pro software was designed. The browser/server mode structure is used to build the teaching platform structure system architecture and network topology structure, to improve the stability of the teaching platform. Logic Pro software is used, combined with Shannon theory, through optimizing channel transmission, balancing power distribution, to create high-quality piano tuning exercises and teaching resources, so as to establish a good teaching platform for students and provide reference for the long-term stable operation of the teaching platform. Connect the above platform programs to mobile intelligent terminal devices using various communication networks, thereby achieving the construction of a mobile education platform for piano tuning courses based on LogicPro software. Through experiments, it has been proven that the mobile education platform for piano tuning courses based on LogicPro software can achieve its course teaching management function and has good stability. At the same time, the platform has good response performance and strong processing power.

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