



Construction of Interactive Teaching Platform for Calligraphy Major in Colleges and Universities Based on Streaming Media

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Abstract. In the era of “Internet + Education”, the new generation of digital information technology is accelerating the integration with modern education innovation, which has injected new vitality into the calligraphy education in colleges and universities. In order to promote the reform of teaching mode of calligraphy major in colleges and universities, this paper puts forward a set of construction scheme of interactive teaching platform for calligraphy major in colleges and universities, which opens up a new direction for the cultivation of calligraphy talents in the new period. The platform adopts B/S architecture, and the core interactive teaching is realized by Nginx-RTMP streaming media server module, RTMP transmission protocol and Flash player, and is subject to the call and control of Web Server. In addition, the Web Server is built by ThinkPHP, and some functional modules such as file uploading and learning effect evaluation are deployed. The measured results of fuzzy comprehensive evaluation model show that the construction of interactive teaching platform is of positive significance to stimulate students’ enthusiasm and improve the effectiveness of calligraphy teaching.

Keywords: streaming media technology · calligraphy education · RTMP · PHP · computer application

1 Introduction

Calligraphy major has been officially listed as a first-class discipline since September 2022, which has promoted calligraphy education in colleges and universities to a new level and will also lead calligraphy professionals into a new stage of vertical development. Calligraphy has entered the first-class discipline, which is of great significance. On the one hand, it will boost our own cultural self-confidence and realize the inheritance and development of the country’s traditional excellent culture. On the other hand, from the perspective of top-level design, the calligraphy major should be re-planned and laid out to expand the development space of professionals and consolidate the support of subsequent talents [1]. In addition, from the perspective of necessity, the promotion of the professional status of calligraphy will inevitably lead to the renewal and improvement of the education system, and will also put forward new requirements for the construction of the calligraphy discipline system. In addition, with the rapid rise of the new ecology

of “Internet + Education”, the reform of teaching mode and the innovation of education mechanism of calligraphy specialty are the primary problems facing colleges and universities in the whole society [2]. In view of this, aiming at the problems in the teaching process of calligraphy specialty, such as weak systematicness, single teaching method and weak teachers, this paper will build an interactive teaching platform for calligraphy major in colleges and universities based on Web with the help of the practical characteristics of streaming media technology, network information technology and computer application technology. It puts forward a set of practical plans for promoting the reform of teaching mode of calligraphy specialty in colleges and universities, and opens up a new direction for the cultivation of calligraphy talents in the new period.y [3].

2 Development Process

First of all, the realization of the online live course function mainly depends on the streaming media technology architecture. The technical structure of streaming media includes three parts: encoder, streaming media server and client player [4]. Among them, the encoder is at the teacher’s end, and its core function is to collect and transform the audio and video signals during the teacher’s teaching to form small transmittable data packets. In this paper, FFmpeg application is selected as the encoder, and the audio signals collected by the microphone are packaged into MPEG2-TS format files according to AAC coding algorithm. At the same time, according to the H.264 coding algorithm, the video signals collected by the camera are encapsulated into FLV format files, and then the encapsulated data packets are sent to the streaming media server according to the RTMP transmission protocol to complete the streaming operation [5]. The streaming media server is built by Nginx and Nginx-Rtmp-Module, which can organize and control the collection, transmission and playback of the whole streaming media transmission process. The client player will choose a Flash player with high system adaptability, which aims to perform operations such as unpacking, decoding and audio-video synchronization on the received data packets to realize audio-video content playback [6]. When the Flash player is deployed, the JWplayer framework is needed to enrich the user’s demand for player control.

Secondly, we will choose “LNMP” mode for the development of Web application server, that is, Linux is the bottom operating system, Nginx is the Web server, MySQL is the database server, and PHP is the scripting language. Under the integrated development tool PHPStorm 2020.1, the Thinkphp 5.0 framework project is imported, and the virtual machine configuration, MVC creation, single entry file configuration, and the corresponding functional modules are selected to realize specific functions are completed [7]. Through the introduction of the above key technical theories, the overall environment of system development, the configuration of related software and tools are determined, and the technical feasibility of the overall project of interactive teaching platform for calligraphy major in colleges and universities is also clarified.

3 Function Realization

3.1 Client

a. Live broadcast and playback

Under this function module, student users can choose courses and teachers that meet their own preferences or learning needs and join the study according to the information list of live courses. Compared with traditional classroom teaching, the content of live broadcast course is more targeted and interesting. In the live class, students can directly see the teacher's on-site writing or copying, and more intuitively and meticulously see the different display effects caused by the subtle gap between writing and using ink in calligraphy, so as to enhance their mastery of calligraphy knowledge and skills. In addition, the platform will also set up a playback function, so that students can learn and consolidate at any time. The realization of this function requires the Nginx-Rtmp-Module module of streaming media server to reconfigure the data port and file storage location of RTMP protocol service. For example: `rtmp {server {listen 1980; chunk_size 4096; application vod { play /opt/media/vod; #//text.mp4.}}}` [8].

b. Live interaction

In the live broadcast course, students can ask interactive questions to teachers at any time, and communicate their own problems directly in the live broadcast room in the form of text barrage. At the same time, students who watch can actively participate in the discussion, and teachers can grasp the real situation of students' learning according to the discussion [9]. In addition, when student users fill in and publish through the text input box in the interface, the platform will automatically save the corresponding barrage content.

c. Works uploaded

Student users can upload their calligraphy works to the platform, and the upload file format supports two kinds of pictures or videos, which is convenient for the storage and display of their works. Other users can also post corresponding comments under their works, providing a kind of information feedback for their own calligraphy and providing a new channel for the evaluation of calligraphy learning effect.

3.2 Anchor Side

On the anchor side, the functional authority of teacher users includes three parts: course management, course live broadcast and data analysis. Among them, course management mainly involves the addition and modification of teacher information, course time and live broadcast title. The live broadcast of the course is the main page of the teacher's teaching, including screen box, barrage information box, interactive function box and other functional plug-ins. After the live broadcast course is over, teachers and users can view the live broadcast and accumulated live broadcast data under the data analysis function, as shown in Table 1, which is the statistics table of live broadcast course data.

In addition, under the data analysis module, the system will also use the fuzzy comprehensive evaluation model to evaluate the actual application effect of the platform.

Table 1. Statistical Table of live broadcast course data

Time	Live title	Viewer number (peak)	Visitor number	Per capita viewing time
22.11.01	Basic strokes and structure	2137	2579	19.3 min
22.11.07	European-style calligraphy	3514	4016	21.1 min
22.12.04	Mi Fu “Shusu Calligraphy”	5621	6132	18.7 min

Table 2. Effectiveness test data of the interactive teaching platform for college calligraphy majors

Target layer	Standard layer	Measures layer	Weighted value	Item score	Score
Application evaluation	Instructional	Cumulative viewing time	A1 = 0.091	84	7.644
		Viewer number (peak)	A2 = 0.131	78	10.218
	Interactivity	Total number of barrage	A3 = 0.154	68	0.924
		Interaction frequency	A4 = 0.074	70	2.578
	Effectiveness	Calligraphy evaluation results	A5 = 0.136	83	5.180
		Course satisfaction	A6 = 0.059	71	4.189
		

Table 2 shows the effectiveness test data of the interactive teaching platform for calligraphy majors in colleges and universities, and the formula for calculating the weight value of a single object or element is shown in Formula 1, where λ_{\max} represents the weight value, A represents the hierarchical level, and W ranks the weight vector [10].

4 Conclusion

In order to promote the reform of the teaching mode of calligraphy major in colleges and universities, this paper starts with many problems faced in the teaching process of calligraphy major, and builds an interactive teaching platform based on Web with the help of the application advantages of streaming media technology, network information technology and computer application technology, which opens up a new direction for the cultivation of calligraphy talents in the new period. The platform reshapes the teaching process of calligraphy major with convenient and efficient interactive live teaching,

which is of positive significance to stimulate students' enthusiasm and improve the effectiveness of calligraphy teaching. In the follow-up research, the richness of the educational service content of the platform needs to be further strengthened, and the forms and means of interaction need to be improved in the next stage of research.

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