



Construction of Traditional Wushu Online Teaching System Based on Streaming Media Technology

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Abstract. As a brand-new course teaching mode, Internet + education has obvious advantages in realizing teaching innovation and strengthening teaching effect in colleges and universities. However, in view of the special education category of traditional Wushu, the integration of online education and traditional Wushu courses is insufficient, and there is a lack of practical application scheme. In this regard, this paper puts forward a set of construction scheme of online teaching system, which provides new ideas for realizing online teaching of traditional Wushu courses. In the Java language environment, the system uses JSP pages and SSM framework to complete the construction of functional structure, and combines streaming media technology to highly integrate remote login, live lecture, resource sharing, data analysis and other application services to form a traditional Wushu wisdom education platform. Practice has proved that the functions of the system are applied normally, which can give full play to the advantages of streaming media technology and create a new ecology for traditional Wushu education in colleges and universities.

Keywords: streaming media technology · traditional Wushu · online teaching · Javaweb · computer software application

1 Introduction

Under the background that “internet plus” has become a national development strategy, the rapid rise of Internet + education has greatly changed the current teaching mode and education management mechanism in colleges and universities [1]. The comprehensive integration of a series of digital information technologies provides numerous teaching methods and teaching forms for college teaching practice, which promotes the improvement of teaching efficiency and helps students broaden their horizons and realize personalized development. However, traditional Wushu education, as a comprehensive and practical physical education discipline, is often difficult to organically integrate with online education due to various courses, lack of teaching resources and shortage of professional teachers, so that traditional Wushu education in colleges and universities lags behind obviously [2]. In this regard, this paper holds that traditional Wushu education in colleges and universities should give full play to the application advantages

of digital information technology, introduce the formal innovation of online teaching into the practice of Wushu education in colleges and universities, and build an online teaching system of traditional Wushu in colleges and universities that meets the current practical application needs. It can boost students' learning motivation and enhance the teaching effect, and set up a new paradigm for traditional Wushu education in colleges and universities in the new period.

2 Development Process

First of all, the framework of streaming media technology mainly involves many core modules such as audio and video acquisition, coding tools, transmission protocols, streaming media servers and players [3]. Audio and video acquisition needs the support of microphones and cameras, and the encoding tool is FFmpeg. After receiving the audio and video digital signals, FFmpeg will convert the audio and video digital signals into streams according to AAC audio compression coding algorithm and H.264 video compression coding algorithm respectively, and complete the encapsulation in MPEG2-TS and FLV formats respectively [4]. Then, according to the server key under RTMP communication protocol, the encapsulated audio and video files are sent to the streaming media server to complete the streaming operation. The streaming media server is based on Nginx-Rtmp-Module module, which can regulate and distribute the data stream and realize the streaming operation of audio and video files from the server to the player. For the player, the JWplayer framework can be used to complete the embedded deployment, which is convenient for users to use online.

Secondly, for the Web development of the system, one part is to complete the design and development of the front-end interactive interface based on JSP technology, and the other part is to complete the construction of the Web Server based on SSM framework [5]. In the configuration of basic development environment, the bottom operating system is Linux CentOS 7.0, Nginx is the Web server, and MySQL 5.7 is the database server. In the Java language environment, the integration and configuration of SSM framework are completed by using Eclipse Version 2020 integrated development tools, and a standard MVC structure is formed, which provides convenience for the development of subsequent functions [6].

3 Functional Implementation

3.1 Student Side

A. Live Courses

According to the information list of live courses, student users can choose courses that meet their own preferences or learning needs and join the study. In the live class, students can directly see the teacher present the Wushu skills in a visual, intuitive and three-dimensional way, giving students the opportunity to observe and recognize independently [7].

In order to further improve the live viewing experience of student users, the system will use Brotli algorithm to compress the original resource files to improve the transmission efficiency of CDN distribution network. Brotli algorithm can be directly deployed on the streaming media server, and the configuration code is as follows [8]. Compared with the same type of Gzip algorithm, Brotli algorithm has certain advantages in decompression speed and compression ratio (the lower the compression ratio, the better), as shown in Fig. 1. On the whole, the compression performance of Brotli is 18%-23% higher than that of Gzip algorithm.

```
--add-module=/path/to/nginx_brotli_module
http { brotli on;
    brotli_comp_level 6;
    brotli_types text/plain text/css application/json application/javascript application/
x-javascript text/xml application/xml application/xml+rss text/javascript; }
```

B. Live Interaction

In the process of live teaching, student users can interact with teachers through the “barrage” function. The interactive content includes students’ questions, discussions in the teaching process and students’ evaluation of teachers and courses.

C. Resource Sharing

The system will also provide a large number of digital teaching resources to assist the daily study of student users. Digital teaching resources can not only cover a wide range of traditional Wushu categories, but also incorporate excellent contents such as Wushu culture, curriculum ideology and politics, mental health and so on, thus forming a multi-dimensional and three-dimensional teaching resource service system [9].

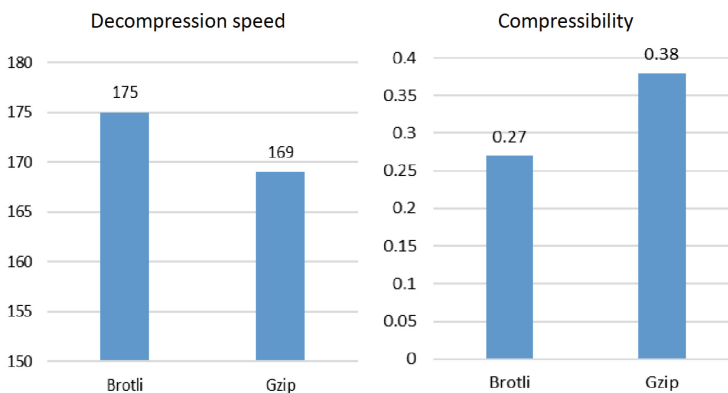


Fig. 1. Utility comparison of the Brotli algorithm

Table 1. Statistical table of live course data

Live time	Live title	Viewer number (peak)	Per capita viewing time	Barrage number
23.02.03	YangTaiChi 1	1320	20.3 min	2866
23.02.06	YangTaiChi 2	1055	19.3 min	1914
23.02.11	YangTaiChi 3	1003	20.6 min	2031

3.2 Teacher Side

On the teacher side, teacher users have the functions of system management, online live broadcast and data statistics. When the live lecture is over, teachers can check the live broadcast and accumulated live broadcast data under the statistics. Table 1 shows the statistics of live broadcast data of a course.

In addition, the system can help teachers to analyze and evaluate the teaching effect of the course. The system will automatically obtain the behavior data of student users during the live lecture, and score from the teaching, interaction and effectiveness of the course. Table 2 shows the simulation data results of the course teaching effect evaluation, in which the weight value will be calculated by AHP. The calculation formula is shown in Formula 1, where λ_{max} represents the weight value, A represents the hierarchy, and W ranks the weight vector [10]. The test shows that the satisfaction between the course and teachers is high, but the frequency of interaction and the total number of barrage are at a low level, which requires teachers to continue to strengthen interaction and communication in the course.

$$A = \begin{bmatrix} A_{11} & A_{12} \\ A_{21} & A_{22} \\ A_{31} & A_{32} \end{bmatrix} \lambda_{max} = \sum_{i=1}^n \frac{(AW)_i}{nW_i} \tag{1}$$

Table 2. Simulation data results of the course teaching effect evaluation

	Primary index	Secondary index	Weighted value	Item score	Score
Teaching evaluation A	Teaching A ₁	Mean viewing time A ₁₁	A ₁ = 0.186	80	14.880
		Viewer number (peak) A ₁₂	A ₂ = 0.161	73	11.753
	Interaction A ₂	Total number of barrage A ₂₁	A ₃ = 0.126	61	7.686
		Interaction frequency A ₂₂	A ₄ = 0.147	70	10.290
	Effectiveness A ₃	Teacher satisfaction A ₃₁	A ₅ = 0.189	80	15.12
		Course satisfaction A ₃₂	A ₆ = 0.191	77	14.707

4 Conclusions

In order to improve the effectiveness of traditional Wushu education in colleges and universities, this paper puts forward a design scheme of online teaching system based on streaming media, aiming at the problem of insufficient integration between online teaching and traditional Wushu education. The system optimize the whole process and all aspects of traditional Wushu education, and create a new model of traditional Wushu education in the new period. In the follow-up research, the system will further enrich the interactive means between students and teachers, enhance the expansibility and adaptability of streaming media technology, and make contributions to the digital reform of higher education.

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