Hindawi
Mobile Information Systems
Volume 2023, Article ID 9763973, 1 page
https://doi.org/10.1155/2023/9763973

Retraction

Retracted: Multimedia Teaching of College Musical Education Based on Deep Learning

Mobile Information Systems

Received 8 August 2023; Accepted 8 August 2023; Published 9 August 2023

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This article has been retracted by Hindawi following an investigation undertaken by the publisher [1]. This investigation has uncovered evidence of one or more of the following indicators of systematic manipulation of the publication process:

(1) Discrepancies in scope
(2) Discrepancies in the description of the research reported
(3) Discrepancies between the availability of data and the research described
(4) Inappropriate citations
(5) Incoherent, meaningless and/or irrelevant content included in the article
(6) Peer-review manipulation

The presence of these indicators undermines our confidence in the integrity of the article's content and we cannot, therefore, vouch for its reliability. Please note that this notice is intended solely to alert readers that the content of this article is unreliable. We have not investigated whether authors were aware of or involved in the systematic manipulation of the publication process.

Wiley and Hindawi regrets that the usual quality checks did not identify these issues before publication and have since put additional measures in place to safeguard research integrity.

We wish to credit our own Research Integrity and Research Publishing teams and anonymous and named external researchers and research integrity experts for contributing to this investigation.

The corresponding author, as the representative of all authors, has been given the opportunity to register their agreement or disagreement to this retraction. We have kept a record of any response received.

References

[1] W. Li, "Multimedia Teaching of College Musical Education Based on Deep Learning," *Mobile Information Systems*, vol. 2021, Article ID 5545470, 10 pages, 2021.

Hindawi
Mobile Information Systems
Volume 2021, Article ID 5545470, 10 pages
https://doi.org/10.1155/2021/5545470

Research Article

Multimedia Teaching of College Musical Education Based on Deep Learning

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Received 20 February 2021; Revised 9 March 2021; Accepted 22 March 2021; Published 2 April 2021

Academic Editor: Mian Ahmad Jan

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In view of the current situation of musical education and the need for reform in China, we adopt two different methods, i.e., literature method and interview method in this research work. From these methods, we read a lot of musical education, multimedia technology, and modern teaching and reform. This research work is divided into two main phases. Firstly, the article mainly discusses the characteristics of college musical education compared with other cultural courses and the feasibility of multimedia technology and the auxiliary function of musical education that is applied in school's musical education. Secondly, brain computing attempts to analyze things by simulating the structure and information processing of biological neural networks. The intelligent learning characteristic of a deep learning algorithm is proposed to monitor the process of musical education teaching and analyze the process quality. Finally, we introduced the design and production of network multimedia courseware which will help in theoretical guidance and reference to the application of multimedia technology in college musical education in China. Moreover, the outcome of the proposed model can play a role in solving and answering questions in the current multimedia application process and Chinese college music workers will apply multimedia technology more effectively and skillfully.

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1. Introduction

In recent years, the state has actively promoted the construction of teaching sharing platforms such as network quality courses, microcurriculums, and university video open courses. They provide multidisciplinary and multitype quality education resources for the teaching and independent learning of college teachers and students. As a public foundation course, in college musical education, due to its particularity, teachers use multimedia and network technology in teaching far less than other disciplines. Some data show that computers and multimedia have been used in the teaching of various subjects in colleges and universities, but they have not been truly popularized in college musical education [1, 2]. In March 2012, the Ministry of Education's "Special Plan for Higher Education" notice stressed: "Actively promoted based on "the reform of the network's talent training model, teaching content and teaching methods." As the main teaching task of the college musical education curriculum, the transfer of motor skills requires both a simple language expression and a graceful demonstration of movement. To some extent, the intuitive demonstration of action is greater than the role of language. Multimedia that takes full advantage of computer system imagery, animation, and sound resources can demonstrate accurate virtual 3D motion demonstrations for students. At present, there are still problems in teaching publicity and musical education courses in colleges and universities using multimedia to carry out practical teaching, but there are infinite prospects for expanding the network teaching space. Among the many network platforms, well-known IT brands occupy the favorite independent learning platform for college students. In all kinds of network interaction tools, the search and utilization of semiorganized information are also common [3].

The rapid development of network technology provides a broad space for people to learn, live, and communicate. The development of mobile network technology provides more convenient conditions for people to use the network.

Modern college students have a strong ability to use network technology, especially mobile network technology [4]. Brain computing should not process still images but signals that are spatially and spatially continuous. Although there have been many successful applications of deep learning, if we go further, for example, in video analysis and dynamic visual information processing, we will naturally encounter the same tasks as human brain, requiring some recognition of dynamic spatial and temporal patterns. They can easily browse spatial information at any time through communication tools [5]. How to effectively use these modern technologies to improve the quality of education and expand the teaching space of public musical education curriculum is worthy of serious consideration by the majority of musical education teachers [6]. According to the use of network information by college students, combined with the characteristics of musical education curriculum, this paper discusses the establishment of Q-group-based aerial classroom-assisted teaching. It introduces the experimental study of multimedia teaching and network interaction in musical education. Besides, it explores the network-assisted mode of musical education and realizes the musical education model [7]. The specific contributions of this paper include the following:

(1) The characteristics of college musical education and other cultural courses are discussed
(2) An intelligent learning feature based on a deep learning algorithm is proposed to monitor the process of musical education teaching and analyze the process quality
(3) The application of multimedia technology in college physics teaching is studied

The rest of this paper is organized as follows. Section 2 discusses college students' use of the network situation; the generation of multimedia network teaching is discussed in Section 3. The classification of musical education courseware is discussed in Section 4. The basic structure of multimedia network in teaching platforms in college is discussed in Section 5. Section 6 shows the simulation experimental results, and Section 7 concludes the paper with a summary and future research directions.

2. College Students Use the Network Situation

According to the latest statistics from the China Internet Network Information Center, the total number of Internet users in China has reached 564 million by the end of December 2012 [8, 9]. The number of new Internet users in the country is 50.9 million and the penetration rate of the Internet is 42.1%. It increased by 3.8% in comparison with the end of 2011. Figures 1 and 2 show the scale and penetration rate of Chinese data from 2005 to 2012.

It can be seen from Figure 1 that China had grown from 11 million in 2005 to 564 million in 2012, and the penetration rate of the Internet has increased from 8.5% in 2005 to 42.1% in 2012. Such a clear upward trend and penetration rate indicate that China has entered the ranks of major Internet countries. According to data analysis and statistics released by the China Internet Network Information Center, the scale distribution and Internet penetration rate of various provinces (cities, autonomous regions) in mainland China have increased significantly from 2011 to 2012. It can be seen from Table 1 that China's Internet has been fully covered in various provinces (municipalities and autonomous regions). Although the distribution of various regions is still uneven, some remote and minority areas have relatively low coverage. However, they are relatively low in these areas. The growth rate is increasing. This shows that China has entered a new era of the network [10].

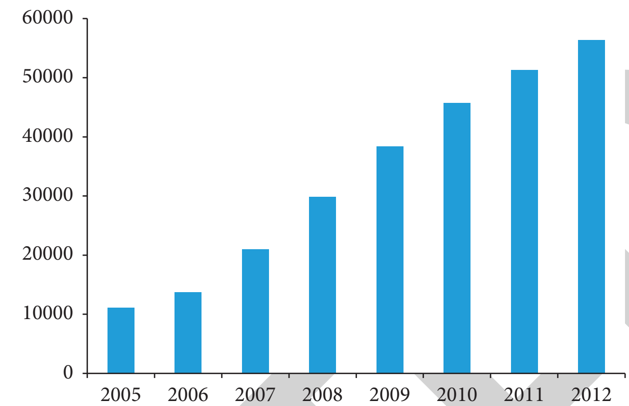

Figure 1: The scale of Chinese citizen.

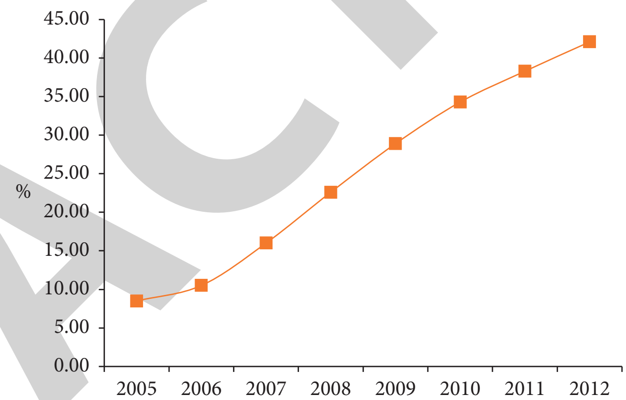

Figure 2: The Internet penetration rate in China.

According to a survey conducted by the China Internet Network Information Center (CNNIC) in the survey report on Internet users, the Internet usage rate of college graduates or above reached 96.1% in 2012. Basically saturated, the penetration rate of high school students in the past five years is the most obvious. In 2012, the proportion exceeded 90%, reaching 90.9%. It can be seen that among the users of the current Internet, college students account for the largest proportion.

3. The Generation of Multimedia Network Teaching

There is no unified definition of multimedia network teaching. The so-called multimedia network teaching is to

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Table 1: Size and Internet penetration rate of Internet users in various provinces (municipalities and autonomous regions) in Mainland China, 2011–2012.

Province	Number of citizens (10,000 people)	Popularity rate (%)	Citizen growth rate (%)	Popularity ranking	Citizen growth rate ranking
Beijing	1458	72.2	5.8	1	27
Shanghai	1606	68.4	5.3	2	29
Guangdong	6627	63.1	5.2	3	30
Fujian	2280	61.3	8.5	4	23
Zhejiang	3221	59.0	5.5	5	28
Tianjin	793	58.5	10.3	6	18
Liaoning	2199	50.2	5.1	7	31
Jiangsu	3952	50.0	7.2	8	25
Shanxi	1589	44.2	13.1	9	13
Hainan	384	43.7	13.6	10	12
Xinjiang	962	43.6	9.1	11	21
Qinghai	238	41.9	14.7	11	9
Hebei	3008	41.5	15.9	13	7
Shaanxi	1551	41.5	8.6	14	22
Chongqing	1195	40.9	11.9	15	16
Ningxia	258	40.3	24.5	16	1
Shandong	3866	40.1	6.7	17	26
Hubei	2309	40.1	8.5	18	24
Neimenggu	965	38.9	12.9	19	14
Jilin	1062	38.6	10.0	20	20
Heilongjiang	1329	34.7	10.2	21	19
Guangxi	1586	34.2	17.2	22	4
Hunan	2200	33.3	13.6	23	10
Xizang	101	33.3	12.7	24	15
Sichuan	2562	31.8	14.9	25	8
Anhui	1869	31.3	17.9	26	3
Gansu	795	31.0	13.6	27	11
Henan	2856	30.4	10.6	28	17
Guizhou	991	28.6	17.9	29	2
Yunnan	1321	28.5	15.9	30	6
Jiangxi	1267	28.5	16.5	31	5
National	56400	42.1	9.9	—	—

fully utilize the most advanced computer network technology and multimedia technology. A new teaching method with organic combination teaching is the implementation of multimedia technology under the support of Internet technology. This makes implementation of a teaching method based on communication and discussion [11, 12].

Multimedia network teaching is a kind of distance learning. According to the development of major media and information technology, multimedia network teaching belongs to the third generation of distance learning. Multimedia network teaching is the product of the development of modern computer network technology and multimedia technology to a certain extent. The famous Chinese scholar made a detailed summary of the three generations of information technology used for teaching and the stage of three generations of distance education. It can be seen from Table 2 that since the 1990s, with the emergence and development of computer network technology and computer multimedia technology, two-way interactive electronic information communication technology has been realized, which makes the teaching process more open and flexible. Therefore, with the emergence and development of new technologies, multimedia network teaching has emerged [13–15].

We also obtained the most published new data by logging on to the Chinese University and found that, by the end of 2012, there are 2,148 universities in China, 31 of which are top universities, 1.44%. 256 colleges and universities with comprehensive music majors accounted for 11.9% of the total number of colleges and universities in China. At present, these colleges have their own independent campus network for the management of school information and the presentation of quality courses for the usual educational system. However, most college websites have not yet built their own multimedia network teaching platforms because there are still many vacancies in the application of multimedia network teaching technology.

4. Classification of Musical Education Courseware

Musical education courseware can be divided into two major categories, namely, the principle teaching mode and the training teaching mode. The principle teaching mode can be divided into principle teaching and technical teaching. The principle teaching is to briefly introduce the

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Table 2: Three generations of information technology and three generations of distance education.

Staging	First generation	Second generation	Third generation
Age	From the mid-19th century to the mid-20th century	From the mid-20th century to the end of the 1980s	From the 1990s to the present
Distance education classification	Correspondence education	Distance education in multimedia teaching	Open and flexible distance learning
Information technology	Traditional printing technology. Postal transmission technology. Early audiovisual technology.	One-way transmission-based electronics. Information and communication technology.	Two-way interactive electronic information. Communication technology.
Main media	Printing materials, photography, electricity words, slides, vocals, projections, recording, film, early recording	Mass media (broadcasting, Satellite TV), personal media (audio recording, CD-ROM, microcomputer), early remote electronic communication, computer-aided teaching	Modern remote electronic communication, no line mobile communication, computer multimedia, computer network, knowledge (smart) media, virtual technology

characteristics, origin, evolution, development and rules, venue, and movement methods of the project and help students to establish a complete knowledge concept. Technical teaching is to use the CAI courseware to display the complex technical movements and some of the world's best athletes' scientific and standardized technical actions on the screen by means of "slow motion" and "settlement" on the screen so that students can see clearly and explore the key technical points of the various movements that you have to master, increase the depth of understanding, and enable students to master music knowledge and skills more and better [16, 17].

The training teaching mode should follow the principle of differential treatment, reasonably arrange different practice steps and methods, improve students' understanding of basic knowledge and basic concepts of technology, movements, and methods, and analyze and solve problems. It is seen in Figure 3.

4.1. Basic Requirements for Courseware Design. The design of courseware must fully reflect the characteristics of integrating animation, picture, video, sound, text, and other multimedia into one. It gives full play to the advantages of multimedia teaching. With intuitive expressions, rich media resources, and varied presentation methods, teachers can easily explain and control. Students can easily learn and can fully utilize their initiative, interactivity, and collaboration to better meet the campus. The stable Internet and fast downloading speed are needed for distant education [18].

The overall structure of multimedia courseware is composed of teaching objectives and teaching content. The teaching objectives of the courseware include enhancing the physique of the students, mastering the basic knowledge, skills, cultivating the students' good ideology and morality, and improving the students' ability to observe and imitate, as shown in Figure 4. The teaching content of the courseware includes theoretical and practical lessons, and the content of the courseware teaching content is shown in Figure 4.

5. Basic Structure Multimedia Network in Teaching Platform in College

The multimedia network teaching platform adopts the latest B/S (browser/server) structure, and its structure is shown in Figure 5. The characteristics of the structure are as follows: the environment applied by the client is a standardized and universal web browser and all applications are stored on the webserver, and they can be directly downloaded when needed. It is easier to manage and maintain because the client does not need special software. When upgrading a network application, you only need to update the software in the server; such a structure has good scalability and openness. The B/S structure adopts a standard TCP/IP working protocol, and the school can meet its own development needs and extend the system at any time.

The working principle of the system: teachers and students access the multimedia network teaching platform through the browser. The students use the personal computer equipment to connect with the server through the browser. They carry out related musical education teaching content learning, music resource information query, and the timely time between teachers and students. The administrator of the multimedia network teaching platform and the college musical education teacher can update and maintain the content stored on the server through the browser. It can upload the latest musical education resource information to the server, and at the same time, it can realize online answering with the student. It can make music guidance. The server consists of a web server and a database server. The web server stores various application modules of the system, completes the application function of the client, receives the request of the client user, converts it into a database request, interacts with the database server, and downloads the interaction result to the browser as a web page. The user can observe the result of the request. The database server stores the database and its management software is required by the system. It performs database operations according to the request sent by the web server, and it transmits the result to the webserver.

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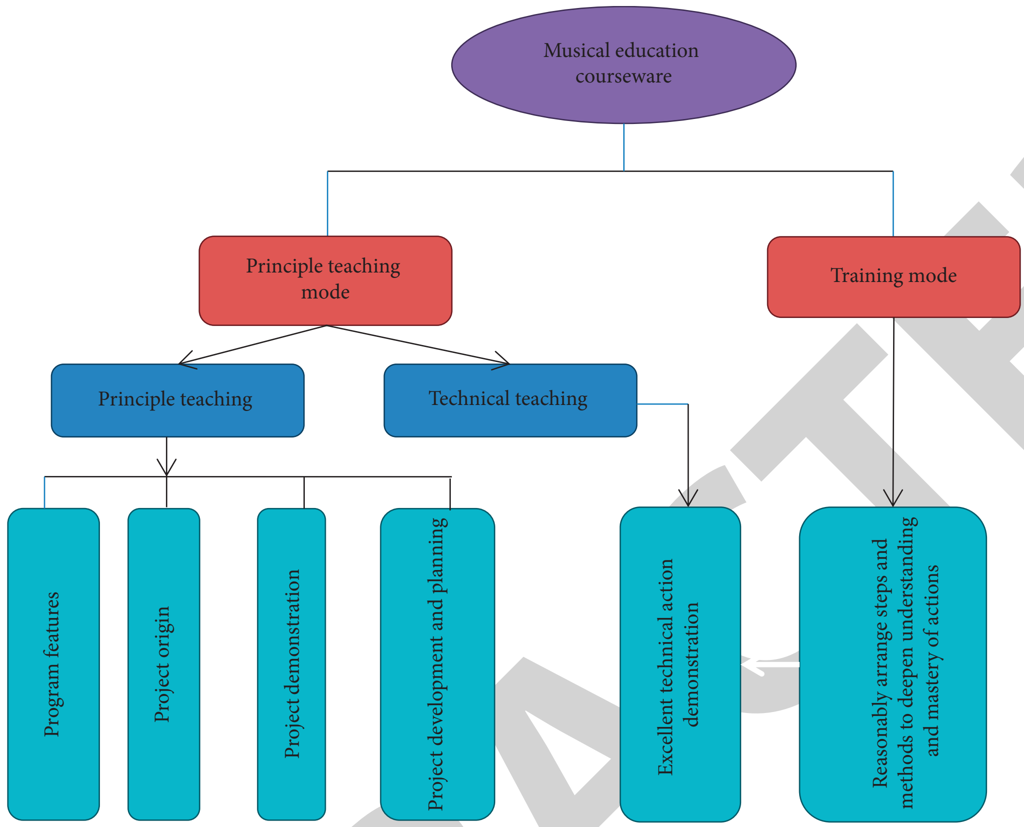

Figure 3: Musical education course structure diagram.

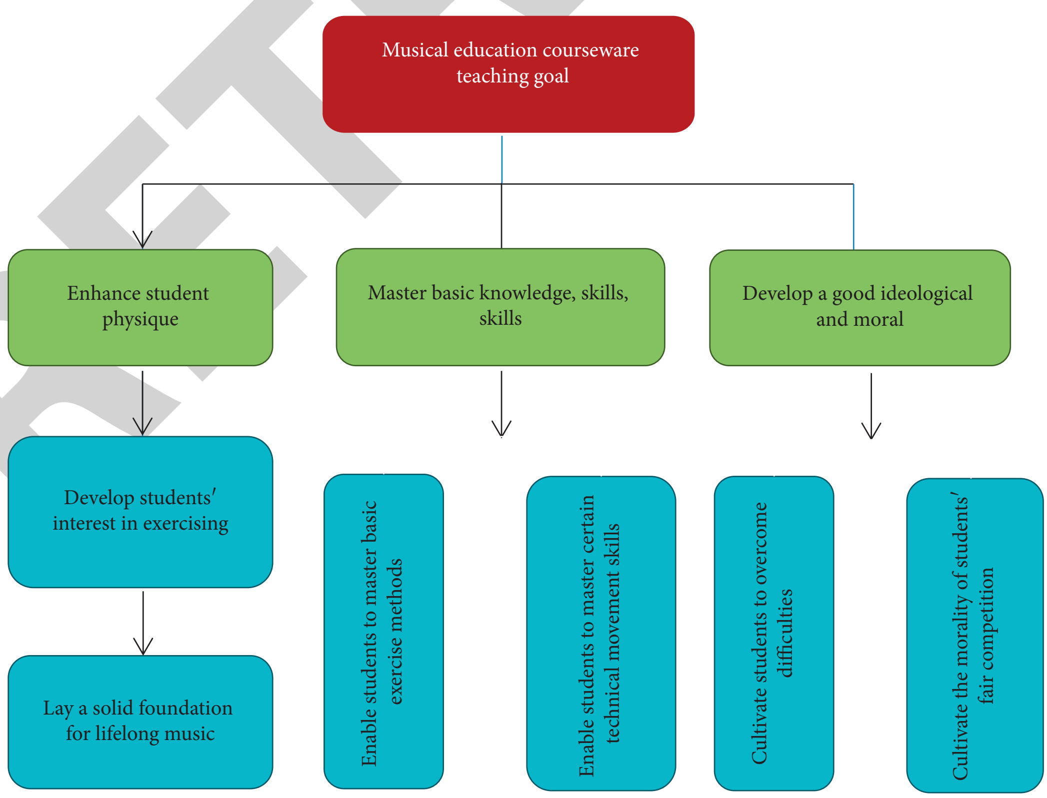

Figure 4: Musical education class multimedia teaching target structure.

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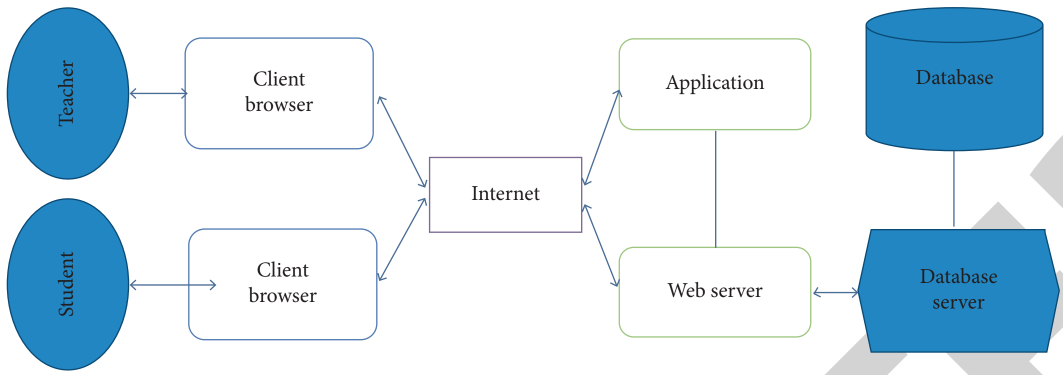

Figure 5: Multimedia network teaching platform structure.

5.1. Supporting Environmental Structure of College Music Multimedia Network Teaching Platform. The promotion of multimedia network teaching platforms in college musical education is inseparable from the construction of the platform environment. According to the Modern Distance Education Teaching Support System in the Technical Specifications for Modern Distance Education Resources Construction, we propose a supporting environment structure diagram for a college music multimedia network teaching platform as shown in Figure 6.

5.2. Musical Education Module. The musical education module is the core module of the college music multimedia network teaching platform. The main function of this module is the display and assistance of the college musical education teaching process. The module includes submodules such as introduction to the course, electronic teaching materials, teaching plans, multimedia network courseware, live teaching, lecture video (including excellent course display), and course resource collection. Through the musical education module, the teacher will edit and upload the information resources of the lectures. Students can use this module to understand the musical education curriculum and conduct independent music learning. With multimedia network courseware, you can also visualize multimedia animations of difficult technical movements that occur during the course of musical education so that students can better understand and master the essentials. Through the implementation of the lectures, the musical education process can be viewed online remotely, and other institutions with relatively poor musical education resources can also conduct musical education courses through this submodule. The lecture video is good for students to review and enhance memory after class. The logical structure and implementation of the live teaching submodule under the musical education module are shown in Figure 7.

5.3. Brain-Like Computing Process. The i-th particle is written as the solution vector $X_i = (x_{i1}, x_{i2}, \ldots, x_{i\,d})$. If the position vector is denoted by $P_i = (p_{i1}, p_{i2}, \ldots, p_{i\,d})$ and the velocity vector is denoted by $V_i = (v_{i1}, v_{i2}, \ldots, v_{i\,d})$, then $x_{i\,d} = \langle p_{i\,d}, v_{i\,d} \rangle$. Calculate the best position bp_i (preferably the position corresponding to the fitness value) experienced by each particle i so far, and call it the optimal position of the individual; calculate the optimal position gP of the entire population up to the current position, and call it the global optimum. Then get the optimal solution through multiple iterations. In each iteration, the particles update their speed and position by tracking and gP, as in the following formula:

$$\begin{aligned} v_{i\,d}^{t+1} &= \omega v_{i\,d}^{\prime} + c_1 r_1 \left(bp_{i\,d} - x_{i\,d}^{t}\right) + c_2 r_2 \left(gP_d - x_{i\,d}^{t}\right), \\ x_{i\,d}^{t+1} &= x_{i\,d}^{t} + x_{i\,d}^{t+1}. \end{aligned} \tag{1}$$

Among them, t is the number of iterations, ω is the inertia weight, c_1, c_2 are positive acceleration constants, and r_1, r_2 are two random numbers obeying uniformly distributed value between [0, 1].

Sample entropy is a time series complexity measurement method proposed by Richman. The musical meaning represents the rate of new information generated by a nonlinear dynamic system. The larger the sample entropy, the higher the degree of complexity. As an improved algorithm of approximate entropy, its remarkable superiority lies in the fact that it can rely less on the length of time series and better precision, and it is widely used in the processing of physiological signals and various complex signals. For a discrete sequence $x(n)$ of L points, the sample entropy calculation process is as follows: In step 1, a new set of vectors with the embedding dimension m is constructed: $x(i) = [x(i), x(i+1), \ldots, x(i+m-1)]$, where $i = 1, 2, \ldots, L-m+1$ and then the distance between the vectors $X(i)$ and $X(j)$ is defined as follows:

$$d(i, j) = \max_{k=0,1,\ldots,m-1} |x(i+k) - x(j+k)|. \tag{2}$$

In Step 2, given the threshold tr, for each I, count the number of $d(i, j) < \mathrm{tr}$ and the ratio of this number to the total number of distances $L - \mathrm{m} + l$, denoted as $B_i^m(\mathrm{tr})$, and then average:

$$B_i^m(tr) = \left(\sum_{i=1}^{L-m+1} B_i^m(tr) / (L - m + 1) \right). \tag{3}$$

In Step 3, increase the dimension to $m+1$, repeat the above steps to obtain $B_i^m(tr)$; in Step 4, obtain the theoretical calculation formula of sample entropy:

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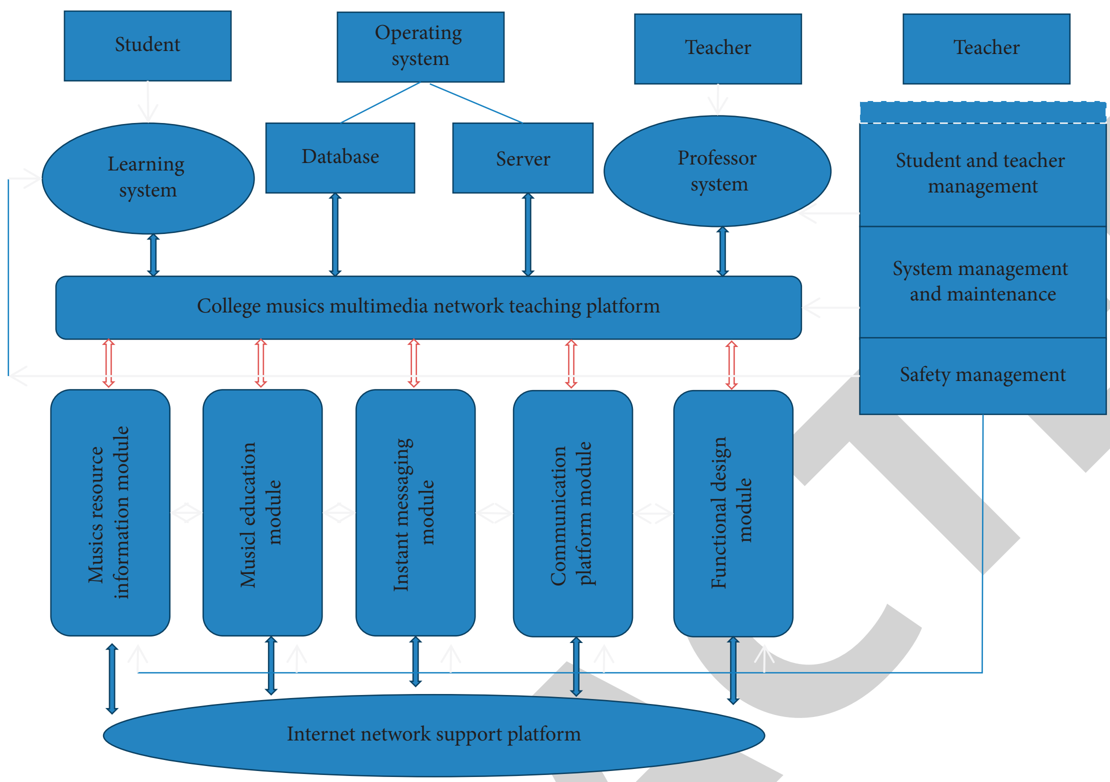

Figure 6: Supporting environment structure diagram of college music multimedia network teaching platform.

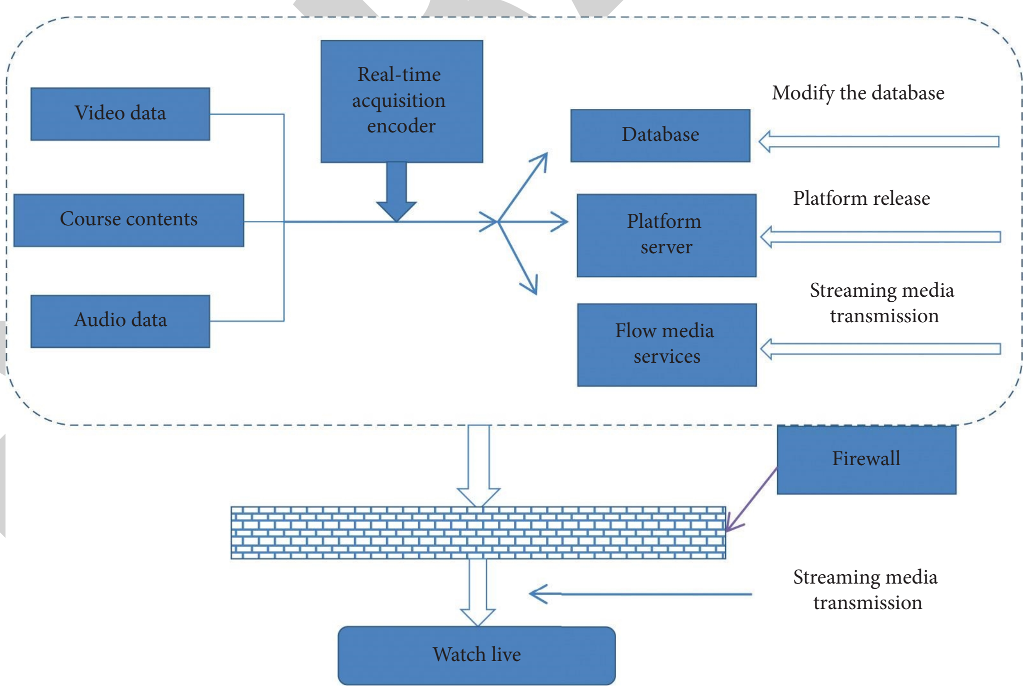

Figure 7: Logical domain implementation of living.

$$\mathrm{Samp}En(m,\mathrm{tr},L)=\lim_{L\longrightarrow\infty}\left(-\ln\left(\frac{B^{m+1}(\mathrm{tr})}{B^{m}(\mathrm{tr})}\right)\right). \quad (4)$$

In the actual calculation, L takes a finite value, and the sample entropy estimate value obtained when the sequence length is L is

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$$\mathrm{Samp}En(m,\mathrm{tr},L) = \lim_{L\longrightarrow\infty}\left(-\ln\left(\frac{B^{m+1}(\mathrm{tr})}{B^{m}(\mathrm{tr})}\right)\right). \quad (5)$$

6. Analysis and Discussion of Results

We have trained 8,000 samples with 128-size batches, 15 epochs, and $10e-3$ learning frequencies. We have tested multiple hyperparameter values before we have selected certain values. After a few tuning moves, we have reached $10e-3$ for the learning pace. We picked 128 for small batch size, which was the best value that could be used without memory size problems. We used cross-entropy as a loss function for Adam Optimizer. In the 15 epochs, we forced an early break, during which we confirmed the inclination of the model to steadily update training estimates. To ensure that we did not overwrite, we measured the assessment metrics for the training data and correlated them with the validation dataset results.

The frequency distribution table of the gate results is as follows, count (Y) indicates the number of each category (frequency count). Sum (Y) is the total score for everyone. Sum (Y) indicates the cumulative number less than the number. According to the above table, a cumulative histogram can be drawn (the abscissa indicates the score). The ordinate represents less than the number of points. From the frequency histogram and the graph in Table 3 and Figure 8, we can also see that the door score is consistent with the normal distribution.

Similarly, the gate score frequency table is as follows: The number of each group shows count (Y) (frequency count). Sum (Y) for all is the overall score. Sum (Y), as seen in Table 4, means a cumulative number smaller than the number. We draw a cumulative histogram according to Table 4 (the abscissa indicates the score; the ordinate indicates the number less than the score). We can also see that the door score is aligned with the normal divides from the frequency histogram and graph in Tables 4 and Figure 9.

The gate effects frequency table is as follows: count (Y) shall mean the number of each group (frequency count). Sum (Y) is the cumulative ranking for both of us. Sum (Y) means that the cumulative number is smaller than the actual number. By plotting the frequency histogram and the graph in Table 5 and Figure 10, we can see that the test scores of the subject are not usually distributed. There are two peaks, as can be seen from the figure, so the explanation may be that the test questions are complicated. There are so many partial challenges, or students' level of learning is polarized.

The frequency number distribution table of the door score is as follows and the count graph indicates the number of each category (frequency count). Sum (Y) is the total score for everyone. Sum (Y) indicates less than the cumulative number of the number. By plotting the frequency histogram and the graph in Table 6 and Figure 11, we can see that the test scores of the subject are not in a normal distribution. It can be seen from the figure that there are two peaks in the left and right of the average line, which means that the questions are difficult and the problems are easy. Or students at high and low levels

Table 3: The distribution of count (Y) and sum (Y).

	X	Count (Y)	Sum (Y)
1	40	3	3
2	50	4	7
3	60	7	14
4	70	9	23
5	80	6	29
6	90	3	32
7	100	2	34

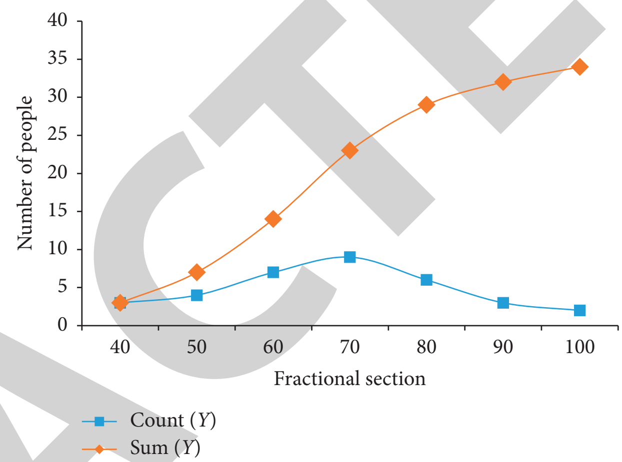

Figure 8: The data of count (Y) and sum (Y).

Table 4: The distribution of count (Y) and sum(Y).

	X	Count (Y)	Sum (Y)
1	50	1	3
2	60	3	7
3	70	8	14
4	80	14	23
5	90	6	29
6	100	2	32

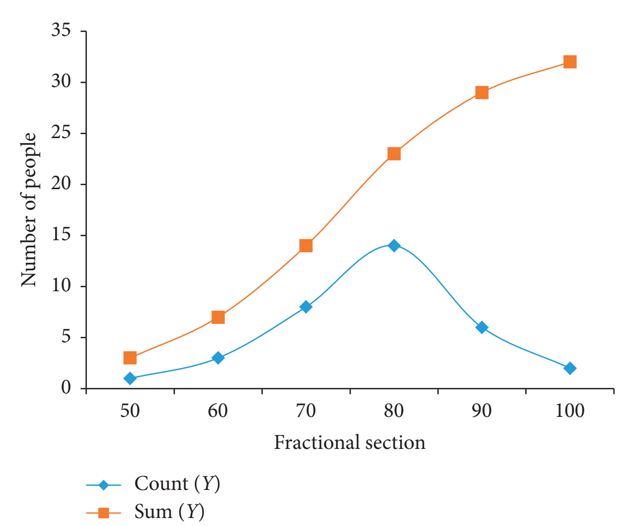

Figure 9: The data of count (Y) and sum (Y).

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Table 5: The distribution of count (Y) and sum(Y).

	X	Count (Y)	Sum (Y)
1	57.5	2	2
2	62.5	0	2
3	67.5	2	4
4	72.5	8	12
5	77.5	6	18
6	82.5	10	28
7	87.5	6	34

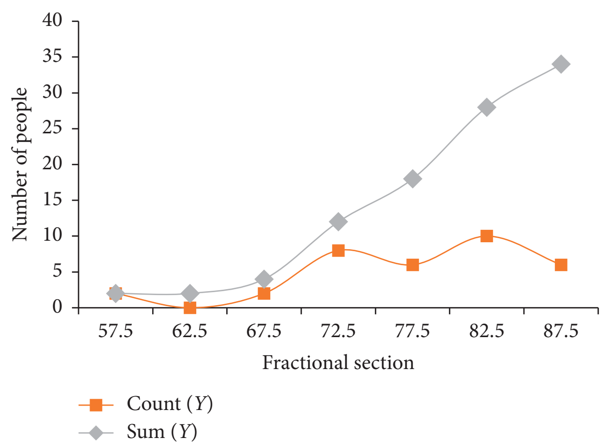

Figure 10: The data of count (Y) and sum (Y).

Table 6: The distribution of count (Y) and sum(Y).

	X	Count (Y)	Sum (Y)
1	52.5	1	1
2	57.5	2	3
3	62.5	0	3
4	67.5	5	8
5	72.5	6	14
6	77.5	6	20
7	82.5	10	30
8	87.5	4	34

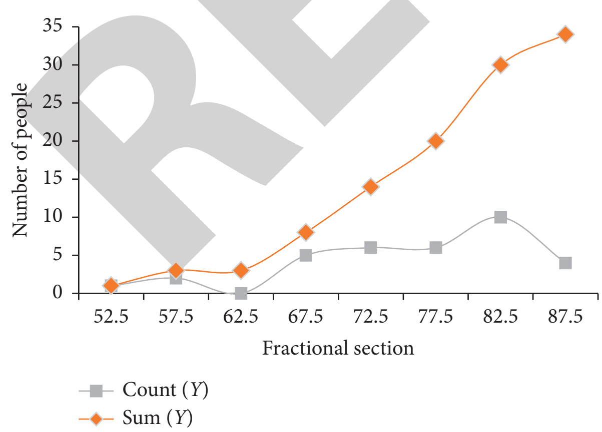

Figure 11: The data of count (Y) and sum (Y).

are distributed in two poles. As can be seen from the figure, the number of students with high scores is higher than the number of students to the left of the average score.

7. Conclusion

Teachers use multimedia for computer-assisted instruction, which provides a new way for education. It changes the relationship between teachers and students, and teachers-centered teaching becomes student-centered teaching. With the continuous development of modern technology, the integration of multimedia, optical discs, and network technologies has changed the way information. It is stored, transmitted, and used. As a new form of education and teaching methods, multimedia will bring great impact and influence to traditional education. The musical education process is the same as the process of students mastering knowledge. There are basic factors such as teachers, students, and teaching content. Musical education activities are very practical bilateral activities of teaching and learning. Both teaching and learning are interdependent and inseparable. Applying deep learning technology to the process of musical education, the impact on teachers, students, and teaching content is of great practical significance.

In the future, we are planning to incorporate, compare, and add tools to study the effects of more in-depth learning frameworks such as the RNN, RCNN, and CRNN.

Data Availability

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

Acknowledgments

This paper was supported by the Educational Planning Project of the 13th Five Year Plan of Hunan Province (XJK20CTW007).

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