The Application of Artificial Intelligence Technology in the Quality Evaluation of Dance Multimedia Teaching in Higher Vocational Colleges

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Abstract. Through scientific and effective evaluation of dance classroom teaching quality, teachers can objectively and accurately evaluate teaching methods, attitudes and effects, and lay a cognitive foundation for the improvement of dance teaching quality. The purpose of this article is to evaluate the teaching quality of dance multimedia in vocational colleges based on artificial intelligence technology. The application of BP neural network in teaching evaluation and the algorithm of BP neural network teaching quality evaluation model are studied, and the construction of dance classroom teaching quality evaluation system is discussed. First, the same teacher uses the same teaching materials and uses different teaching methods to teach the students in the two classes respectively, and secondly, an interest survey on dance classes. The experimental results show that multimedia teaching has brought great convenience to teachers in preparing lessons and improved their professional level. In addition, the use of courseware to demonstrate actions in teaching avoids the negative impact on student presentations due to differences in teacher age, technology, and personal understanding. Compared with the control class, the experimental class increased the density of free practice by 10.93%, and the heart rate increased by 8 times / min.

Keywords: BP Neural Network, Vocational College, Multimedia Teaching, Quality Evaluation

1. Introduction

Artificial intelligence has made important contributions to speeding up administrative processes for educators and educational institutions. In the teaching process, some teaching work is boring and trivial, such as correcting single-choice and multiple-choice questions, checking students' dance back to class, and evaluating papers, etc., consume a lot of valuable time of teachers. Using the classroom
teaching quality evaluation system, schools can quickly and accurately understand the problems in dance teaching, and take effective measures to solve or improve problems in a timely manner, making the school's teaching management more scientific and systematic.

By evaluating the teaching quality, dance teachers can promote teaching purposes, optimize classroom teaching content, and improve various teaching methods and teaching content. Evaluation feedback information can continuously reflect the improvement of dance teacher teaching quality. The quality of dance teachers' teaching is part of the quality of dance assessment. It is an important factor that directly affects the quality of dance assessment. It is also an important requirement for dance talent training in vocational colleges.

Robin Arnall proposed a multi-criteria decision-making method under double hesitant fuzzy environment and applied it to the evaluation of teaching quality [1]. Dimitra Gratsiouni explored the nature of educational quality and proposes different teaching models. This article reviews and analyzes the teaching essence, teaching quality and teaching ability under the background of higher education, and puts forward the characteristics of good teaching. The teaching evaluation was discussed, and a series of standards for evaluating and evaluating teaching activities were proposed [2].

The innovation of this article is to use a neural network to build a mathematical model of the teaching quality evaluation system. As long as the model inputs a certain training set data and after training convergence, that is, once the structure of the neural network and its algorithm are determined, only new Evaluation index data, teaching effect can be determined according to the output of the model. Of course, the accuracy of the model is closely related to the input training samples. The more training samples, the more objective and accurate the expert evaluation results, and the more accurately the mathematical model can describe the teaching effect according to the various evaluation indicators. This paper verifies that the neural network applied to the analysis and evaluation of teaching quality of college teachers is completely effective and reasonable.

2. Proposed method

2.1. Application of BP neural network in teaching evaluation

BP neural network is a kind of multi-layer forward network with three layers (input layer, middle layer, output layer) or three-way unidirectional propagation. The main feature is that the upper and lower layers are completely connected, and there is no connection between the layers of the neuron. The input-output relationship is a highly nonlinear mapping relationship. If the number of input nodes is M, the number of output nodes is N. BP network is a mapping from M-dimensional Euclidean space to N-dimensional Euclidean space [3]. So firstly normalize the attribute values of each index used to evaluate the quality of teaching, input them into the BP neural network model as input vectors, use the evaluation results as output vectors, and use samples sufficient to train the network as professional vectors [4]. In this method, BP's neural network model is trained to adaptively adjust the weighting coefficient value and then obtain the evaluation result until it reaches the correct internal representation of knowledge. Under the guidance of quality, the objectivity of teaching quality evaluation can be guaranteed [5].

Input index normalization processing: Because the input is 100% of the student's score, the order of the size of each component value is very different and needs to be normalized. Because this paper is a
linear transformation of data processing, the maximum method and minimum method are used.

$$X = \frac{1 - I_{\min}}{I_{\max} - I_{\min}}$$  \hspace{1cm} (1)

Where \(X\) is the input value of the normalized neural network, \(I\) is the input value of the unprocessed neural network, and \(I_{\max}\) is the minimum input value of the neural network;

The initial network parameters are \(V_{ij}\), \(W_{jk}\), \(\theta_j\), \(\theta_k\), and the random numbers are small. \(V_{ij}\) is the connection weight of the input layer and the second layer, the threshold is \(\theta\), \(W_{jk}\) is the connection weight of the second layer and the output layer, and the threshold is \(\theta_k\);

The weights and thresholds of each layer have been modified. This paper proposes an improved algorithm based on gradient descent to speed up the convergence of network learning;

$$W_{jk} = (n_0 + 1) = W_{jk}(n_0) + \eta \cdot D_{jk}x_i + \alpha\Delta W_{jk}(n_0)$$  \hspace{1cm} (2)

2.2. Construction of dance classroom teaching quality evaluation system

(1) Construction principles

1) Scientific principles

Scientific principles are a powerful guarantee and prerequisite for the feasibility of value judgment activities, and a principle that must be followed in constructing an evaluation index system for the teaching quality of vocational dance classrooms [6]. In the process of constructing the index system, the selection of indicators and the determination of weights must adopt scientific statistical methods, apply reasonable theories and use data statistics to analyze the survey results quantitatively and qualitatively, so as to ensure the quality of dance classroom teaching. The scientific nature of the evaluation indicators [7].

2) Guiding Principle

Evaluation indicators are specific goals, which can attract teachers to pay attention to the content involved in these indicators, thereby affecting teachers' development towards correct and actively meeting teaching requirements and goals. Therefore, when constructing vocational dance classroom teaching quality evaluation indicators, evaluate The content of the target should be specific, to help dance teachers find their own shortcomings against the content of the index, and correct the problem, and improve the teaching ability in the correct, scientific, and adaptive direction [8-9].

3) Operational principle

The tedious and complicated indicators will increase the difficulty of collecting statistical data, increase the cost of work, and may even be impossible to measure when the evaluation is performed, and become meaningless indicators [10]. Therefore, in the process of establishing the indicators, it is necessary to do everything from the actual situation, to determine the indicators in accordance with the realistic basis, and try to choose a gradual, easy to obtain, reliable, and relatively reflect the actual teaching quality situation under the simple premise index of.

(2) Value proposition

1) The evaluation of dance classroom teaching quality is helpful to the establishment of evaluation standards. Through the guidance function of evaluation, the content and standards of the overall evaluation can be adjusted in time [11]. What kind of evaluation content, the teacher will make
teaching preparations and teaching implementation towards this standard; these will guide the dance
teacher in daily teaching what to do and how to do it [12].

2) Through the evaluation of dance classroom teaching quality, dance teachers can not only clearly
understand the advantages and disadvantages of their own teaching, but also can jointly discuss
through the evaluation of classroom teaching quality such as listening to and watching lessons, which
can strengthen the learning and teaching among dance teachers. Communication, systematic and
scientific evaluation standards of dance classroom teaching quality can stimulate teachers' internal
knowledge and external execution ability more.

3. Experiments

3.1. Research object
Taking preschool education dance students as research objects, randomly select 40 students from two
classes, one for the experimental group and one for the control group.

3.2. Research methods
1) Questionnaire survey
Before and after the lecture, 80 students participating in the experiment were surveyed for their
interest in sports dance. 80 questionnaires were distributed each time, and 80 valid questionnaires were
recovered with an efficiency of 100%.

2) Teaching experiment
The same teacher uses the same teaching materials and uses different teaching methods to teach
students in two classes respectively. Experimental group: teachers guide students to watch courseware
before class Content, preview the content of the next lesson). Control group: Teachers' demonstration—teachers lead students to practice—student group exercises, teacher roving
guidance—teachers explain problems that occur during the exercises—group exercises—review the
content of this lesson after class.

3) Experimental data statistics
In the teaching process, teachers should count the number of teacher demonstrations, the time of
explanation, the time of demonstration, the density of student exercises, the intensity, the subjective
feelings of teachers, the number of learning actions in each lesson, and the class hours used to
complete all teaching tasks.

4) Expert assessment
After completing the teaching tasks, the two groups of students will be tested by the expert group
(10 points system).

4. Discussion

4.1. Comparison of the impact of multimedia technology on learning dance interest
The experimental results show that through one semester of study, the number of people who are very
interested in dancing in the experimental class increased by 14.6%, and the comparative and general
interest decreased by 7.6% and 6.5%, respectively. Looking at the control class again, the number of
people who are very interested increased by 10%, and the comparison and general interest decreased
by 11% and 9%, respectively, as shown in Figure 1.

**Figure 1.** The influence of multimedia technology on learning dance interest

In dance education, students' organs, hands, and feet are used together. In order to intuitively feel the movement characteristics of dance, a multimedia system is used, which can clearly and intuitively display the information of image text and music animation. Students should carefully observe the demonstration actions at different angles, different speeds, and different directions. The impression formed in the brain can clearly stimulate students' interest in learning. Surveys have shown that students' interest in dance lessons has improved to varying degrees since they first saw dance courseware.

In the course of making courseware, the definition, classification, and development history of dance are introduced; the effects on human psychology, physiology, and the role of fitness; the easy mistakes and precautions in the practice process are introduced in detail. In addition, some dance websites are recommended to students, so that they can keep abreast of the latest developments in dance, so that students can have a more comprehensive and systematic understanding of dance from the physical, psychological, and social aspects through the Internet. Moreover, the use of multimedia facilitates students' observation and understanding of action names, movement routes, action directions, and action essentials. It is easier to form temporary neurological connections in the brain and help students remember actions, and compare correct actions and errors on the same screen. Actions can reduce the number of erroneous actions during learning.

4.2. **Comparison of the influence of multimedia technology on the teaching effect of sports dance**

The comparison of the experimental results with the teaching quality is shown in Table 1. In the experimental class, the teaching hours were shortened by 2 hours (2 hours per week) compared with the control group, and the teacher demonstration time was 17.91% less than the control. 15.93%, the average heart rate during exercise increased by 6 times / min. In the teaching test, the experimental class has 2 more excellent people than the control class, 4 more good, 4 less middle and lower, and 2 less qualified.
Table 1. Teaching effect of sports dance and statistics of students’ scores

| Group            | Total teaching hours (weeks) | Explanation and demonstration proportion (%) | Free exercise density (%) | Mean heart rate (10–9) /min | Achievement |
|------------------|------------------------------|---------------------------------------------|---------------------------|-----------------------------|-------------|
| Experience group | 11                           | 45.08                                       | 45.83                     | 88                         | Excellent   |
| Control group    | 12                           | 62.99                                       | 29.9                      | 80                         | Good        |

Before class, students can watch the courseware and preview the content. In the classroom, the teacher will repeatedly explain the students. Therefore, the students have a more comprehensive understanding of the dance movements they have learned, and they keep learning new content with problems, purpose and focus. Reduce teacher instruction, presentation and leadership time accordingly, and increase free practice time. Teachers can have more time to observe students’ practice to find problems and correct them in time to improve teaching quality.

By introducing multimedia teaching, students can review and alleviate the missing content of dance theory lessons in classrooms, dormitories, and families. Multimedia technology has greatly extended the teaching time and expanded the teaching space, connecting indoor and outdoor to the organic hall. Although the experimental class is shorter than the control class, the quality of exercise has improved significantly.

5. Conclusions
Various advanced means in the information age have begun to enter all aspects of life, but the education system also needs to meet the great changes in technology. The modernization of dance teaching directly affects the modernization of education. In order to accelerate the modernization of dance teaching, many schools have introduced multimedia systems into the dance discipline. This article compares and analyzes the effects of multimedia technology on preschool dance students. Through experimental observation of the multimedia system, it has brought many new changes to dance education, and at the same time it provides a reference method for the healthy development of dance education in higher vocational education.

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