



Research on the Diversity of Technical Characteristics of Folk Music Classroom Teaching Based on Network Knowledge Sharing

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Abstract. Aiming at the problem of poor convergence in the research method of feature diversity of music teaching technology, this paper proposes a research on the diversity of folk music classroom teaching technology based on network knowledge sharing. According to the classical viewpoints of international authoritative organizations and domestic and foreign literatures, the evaluation index system is constructed. Analytic hierarchy process (AHP) and Delphi method are introduced to analyze the weight of the evaluation index system. Through network knowledge sharing, the membership degree of teaching technical characteristics is calculated, and the diversity of teaching technical characteristics of folk music is judged. This study makes a comparative experiment on the three methods and analyzes the diversity of teaching techniques of folk music in the classroom. Experimental results show that the proposed method has the advantages of stable application process, short time and good convergence performance.

Keywords: Network knowledge sharing · Folk music · Classroom teaching · Diversity of characteristics

1 Introduction

Teaching is a purposeful, planned and organized activity of two-way interaction between teachers' teaching and students' learning. Therefore, before the implementation of teaching work, it is necessary to select the correct content, formulate methods and strategies in advance, and design carefully according to certain objectives and requirements. In this sense, design and teaching are inseparable, and it can even be said that they are inborn. In traditional teaching, instructional design activities are also indispensable. Every teacher carries out his own "instructional design" consciously or unconsciously in teaching practice. However, due to the constraints of teachers' own experience, knowledge level, educational ideas, teaching conditions and working environment, this kind of design still can not get rid of the dilemma of experiential teaching design [1].

Music teaching system is a complex system with multi factors, multi levels and multi series. Its fundamental purpose is to cultivate students' emotion, shape students' sound personality and cultivate teenagers' all-round development of morality, intelligence, physique, beauty and labor through music teaching. The main elements are teachers (teaching thought, attitude, ability, knowledge structure, personality), students (physique, morality, knowledge, ability level), courses (teaching objectives, contents, methods, evaluation) and conditions (material equipment and technical means), etc. [2]. However, in China's traditional music teaching technology, teachers pay more attention to students' mastery of music theory knowledge and music in time, which leads to the music teaching classroom is very boring, boring, music teaching also lost the original teaching significance. At the same time, this teaching method will also limit students' interest in learning and reduce students' learning efficiency. Therefore, the research on the diversity of classroom teaching technology characteristics of folk music can provide some reference for music teaching research.

2 Research Methods on the Diversity of Technical Characteristics of Folk Music Classroom Teaching Based on Network Knowledge Sharing

2.1 Evaluating the Technical Characteristics of Classroom Teaching of Folk Music

Determine the Evaluation Process of Teaching Technology Characteristics

This evaluation of the technical characteristics of folk music classroom teaching, considering the types and quantity of factors contained in the technical characteristics of folk music classroom teaching, introduces AHP method and Delphi method to construct the evaluation index of the technical characteristics of folk music classroom teaching. And adopt a combination of subjective and objective methods to empower the evaluation indicators established this time to evaluate the technical characteristics of ethnic music classroom teaching. The basic process of evaluating the technical characteristics of ethnic music classroom teaching is as follows:

1. Determine the evaluation system of classroom teaching technology characteristics of national music;
2. Find the supporting system in the evaluation system;
3. Find the elements of the technical characteristics of folk music classroom teaching;
4. Construct the evaluation index system of the technical characteristics of national music classroom teaching;
5. To judge whether the evaluation index system is in line with the establishment principle of evaluation index;
6. When the evaluation index system does not conform to the principle of establishing the evaluation index, the evaluation index system is modified, and the step 4 is returned to reconstruct the evaluation index system of the technical characteristics of folk music classroom teaching;
7. When the evaluation index system is in line with the establishment principle of evaluation index, the evaluation index system is quantified and the standardized evaluation index system is obtained;
8. Empower the established evaluation index system and determine the weight of the

evaluation index system; 9. According to the weight of the evaluation index system, evaluate the technical characteristics of folk music classroom teaching.

Constructing the Evaluation Index System of Teaching Technology Characteristics

There are many constituent factors in the technical characteristics of folk music classroom teaching, which is equivalent to a huge system, but the factors in the system are uneven, which affect the diversity analysis results of the technical characteristics of folk music classroom teaching. Due to the diversification and modernization of ethnic music classroom teaching technology in the development process [3]. Therefore, the construction of the evaluation index system of the technical characteristics of folk music classroom teaching must follow the nine principles of systematicness, scientific rationality, easy operation, relative independence, effectiveness, dynamic comparability, directivity, independence and simplicity. We should control the evaluation index of the technical characteristics of the national music classroom teaching in a certain number, clarify the evaluation index level, and reduce the repetition rate of the evaluation index information. In order to promote this research, the evaluation index of the characteristics of national music classroom teaching technology constructed has high usability and index utilization rate.

According to the above analysis, this paper evaluates the technical characteristics of folk music classroom teaching, and selects the evaluation index from the classic point of view of international authoritative institutions. Combined with the domestic and foreign literature, this paper constructs the evaluation index system, analyzes whether the constructed evaluation index system conforms to the establishment principles of the evaluation index system, and deletes the evaluation indexes that cannot obtain data or are difficult to quantify. The establishment process of the evaluation index system is as follows:

1. By means of frequency statistics, data collection and theoretical analysis, the preliminary evaluation index system is constructed;
2. The cluster analysis method is introduced to evaluate the index categories;
3. Factor analysis method is introduced to screen evaluation indexes;
4. Improve the evaluation index;
5. Eliminate redundant indicators;
6. Build the evaluation index system.

Based on the evaluation index system establishment process of the above design, after screening, the final evaluation index system is determined, as shown in Table 1.

Determine Factor Set

Based on the evaluation index of classroom teaching technology characteristics of national music shown in Table 1, it can be determined that there is a certain subordinate relationship between the factors of classroom teaching technology characteristics of national music. Therefore, the evaluation index of the technical characteristics of folk music classroom teaching shown in Table 1.

Standardization of Evaluation Index

The construction of the evaluation index system of the technical characteristics of folk music classroom teaching, the collection of evaluation index data from different sources, can be roughly divided into Baidu search, field visits, questionnaires, field surveys and other ways. Therefore, in the study, there are big differences in the index data used,

Table 1. Evaluation index system of teaching technology characteristics

First level indicators	Secondary indicators	Third level indicators
The characteristics of classroom teaching technology of national music X	Teaching preparation A	Teaching plan quality A1
		Teaching Aids A2
	Teaching objectives B	Teaching core B1
		Target setting B2
	Content of courses C	Textbook organization C1
		Teaching focus C2
		Team teaching C3
	Teaching methods D	Teaching form D1
		Teaching method D2
		Teacher student interaction D3
		Organizing teaching D4
	Quality of teachers E	Demonstration capability E1
		Teaching instrument E2
		Language expression E3
		Blackboard design E4
	teaching effectiveness F	For all F1
		Emotional development F2
		Organizational capacity F3

which affect the diversity research results. Therefore, according to the linear relationship between the index data, the index data is standardized. For this reason, assume that there is a linear relationship between the collected index data of the established evaluation index, and the mean value of the index data is \bar{X} , then the standardized value Z of the index data is:

$$Z_i = \frac{X_i - \bar{X}}{\sigma} \tag{1}$$

(1) Where, Z_i is the standardized value of the i -th index data; X_i represents the i -th index data; σ is the standard deviation of index data [4].

(2) The standardized value and standardized data obtained by formula will have complex number and decimal number, which will affect the comparison result of index data. Therefore, it is necessary to eliminate the complex number and decimal number after the standardization of index data. The results are as follows:

$$Z_i = 50 + \frac{X_i - \bar{X}}{10\sigma} * 100 \tag{2}$$

According to formula (1) and formula (2), the processed data can be used as the evaluation of national music classroom teaching technical characteristics index data.

Analysis and Evaluation Index Weight

The analysis of the evaluation index weight in the evaluation index system shown in Table 1 is to determine the influence of each evaluation index in the evaluation index system on the technical characteristics of folk music classroom teaching, and sort these indexes according to the influence, so as to provide a strong guarantee for the evaluation results. Therefore, AHP and Delphi method will be introduced to analyze the weight of evaluation index system. Therefore, according to the AHP method, an evaluation index is assumed to be associated with n evaluation indexes. Where C is the importance of the evaluation index, and c_{ij} is the comparison result of the i first level index and the j second level index. At this time, c_{ij} is quantified. The results are as follows:

$$c_{ij} = \begin{cases} 1 & \text{If index } i \text{ is more important than index } j \\ 0 & \text{If index } i \text{ and index } j \text{ are equally important} \\ -1 & \text{If index } j \text{ is more important than index } i \end{cases} \quad (3)$$

In addition to the comparison between the two factors, it is also necessary to determine the evaluation index, which has an impact on the technical characteristics of folk music classroom teaching..

According to Delphi method, the function variable of an index is defined as S , is used to reflect the change of influence difference of evaluation index. At this time, regard the importance of the index as an independent variable stimulus and define it as r ; The function of indicators in the evaluation system of teaching technology characteristics can be regarded as the dependent variable of people’s perception, and defined as s [5, 6]. Then the functional relationship between r and s can be expressed as follows:

$$s = p \lg\left(\frac{r_i}{r_j}\right) \quad (4)$$

Synthesizing formulas (3)~(4), the objective judgment matrix for establishing the importance of indicators is:

$$R = [r_{ij}]_{n \times n} \quad (5)$$

According to the above calculation process, the evaluation indexes in the diversity evaluation system shown in Table 1 are calculated according to the above calculation process, and sorted according to the importance of the indexes according to the calculation results. The sorting results are shown in Table 2.

In Table 2, the number 1 indicates that the former is more important than the latter; The number 0 indicates that the two indicators are of the same importance; The number -1 indicates that the former indicator is less important than the latter.

According to the results of comparison and ranking shown in Table 2, the evaluation indexes in Table 1 are all ranked in the way shown in Table 2, that is, the weight comparison of evaluation indexes is completed, and the technical characteristics of folk music classroom teaching are evaluated according to the comparison results.

Table 2. Evaluation index comparison judgment matrix

	Preparation	Preparation	Target	Means	Quality	Effect
Preparation	0	1	1	1	1	1
Target		0	-1	1	1	1
Content			0	-1	1	1
Means				0	-1	1
Quality					0	-1
Effect						0

2.2 Calculating the Membership Degree of Teaching Technology Characteristic Index

Fuzzy mathematics theory is used to calculate the membership degree of the technical characteristics of national music classroom teaching. The value must be any value between [0, 1]. For this reason, suppose that evaluation index u of any level belongs to evaluation index set X , and given evaluation index set X , the mapping μ_O on interval [0, 1] is as follows:

$$\mu_O : X \rightarrow [0, 1] \quad \mu \rightarrow \mu_O(x) \tag{6}$$

Where, μ_O is the membership function of evaluation factor O , and $\mu_O(x)$ is the membership function of evaluation factor O [7]. According to the membership degree of the technical characteristics of folk music classroom teaching determined by formula (6), we can use the network knowledge sharing technology to judge the diversity of the technical characteristics of folk music classroom teaching.

2.3 Judging the Diversity of Technical Characteristics of Folk Music Classroom Teaching Based on Network Knowledge Sharing

Based on the above content, to determine the diversity membership degree of the evaluation results of the technical characteristics of folk music classroom teaching, we need to use the network knowledge sharing model to judge the diversity of the technical characteristics of folk music classroom teaching. To this end, taking the organizational knowledge subject as the node and the knowledge similarity between subjects as the edge, the network knowledge sharing model is expressed:

$$G_P = (P, E_{P_i-P_j}) \tag{7}$$

In the formula, P represents the collection of knowledge subjects of the organization, that is, the classroom teaching technology of folk music; $E_{P_i-P_j}$ represents the set of edges, that is, the technical characteristics of folk music classroom teaching; (P_i, P_j) indicates the knowledge connection between knowledge subject P_i and P_j [8].

According to (7), we need to use the knowledge semantics in the network knowledge sharing model to express the diversity of the teaching technology and characteristics of folk music classroom. To this end, the following two-tuple K is used:

$$K = \{(m_1, s_1), (m_2, s_2), \dots, (m_n, s_n)\} \tag{8}$$

In the formula, $m_1, m_2, \dots, m_i, \dots, m_n$ means meta knowledge with semantic relationship, that is, the technical characteristics of folk music classroom teaching; $s_1, s_2, \dots, s_i, \dots, s_n$ represents the weight value of the corresponding knowledge element in the organization or subject knowledge, that is, the weight of the evaluation index factors in the technical characteristics of folk music classroom teaching [9].

At this time, combined with (7) and (8), combined with the evaluation index membership degree in the technical characteristics of folk music classroom teaching calculated by (6), the similarity measure of knowledge, that is, the similarity between characteristics and diversity, is calculated, so as to judge the diversity of the technical characteristics of folk music classroom teaching.

Therefore, taking the semantic pattern of organizational knowledge as the standard, the vector space dimension is established, under which the semantic pattern of each subject is extracted to form a group of vectors, and the knowledge similarity between subjects is calculated by VSM. Therefore, the knowledge subject i is denoted as P_i , and the knowledge subject j is denoted as P_j . Suppose KP_i is the weight vector of P_i knowledge element extracted according to Sect. 1.1.5, and the weight vector KP_j of P_j knowledge element can also be extracted. Then the knowledge similarity of P_i and P_j can be represented by the inner product θ of these two vectors:

$$sim(P_i, P_j) = \frac{KP_i \cdot KP_j}{|KP_i| \times |KP_j|} = \frac{\sum_{k=1}^n s_{ik}s_{jk}}{\sqrt{\sum_{k=1}^n s_{ik}^2} \times \sqrt{\sum_{k=1}^n s_{jk}^2}} \tag{9}$$

The larger the calculated value of the formula, the greater the similarity of knowledge between the two subjects, which means that the ethnic music classroom teaching technical characteristics belong to the diversity of its membership; On the contrary, the smaller the knowledge similarity between the two subjects, it means that the national music classroom teaching technology characteristics do not belong to the diversity of its membership [10].

3 Experiment and Analysis

In order to verify the research method of the diversity of the technical characteristics of folk music classroom teaching, comparative experiments will be used to verify the

research method of the diversity of the technical characteristics of folk music classroom teaching. And the research methods of the diversity of the technical characteristics of folk music classroom teaching in this study are recorded as experimental group A, and the two groups of traditional research methods of the diversity of the technical characteristics of folk music classroom teaching are recorded as experimental group B and experimental group C respectively.

3.1 Experimental Preparation

In this experiment, a regional school’s national music major is selected as the research object. There are four year groups in this major, with an average of three classes in each year group and an average of 30 students in each class. A total of 12 classes with 360 students are taught by four teachers, each of whom teaches folk music to three classes on average. In the process of folk music classroom teaching, there are some differences in the teaching techniques and modes of the four teachers, and there are also some differences in teaching students of different grades.

Based on the above content, the determined experimental objects and the experimental data collected in this experiment are shown in Table 3.

Table 3 Experimental data

Year group	Teacher class	Teacher 1	Teacher 2	Teacher 3	Teacher 4
A year	Class one	√			
	Class two		√		
	Class three				√
Two years	Class one		√		
	Class two	√			
	Class three			√	
Three years	Class one	√			
	Class two			√	
	Class three				√
Four years	Class one			√	
	Class two				√
	Class three	√			

Note: “√” refers to the class taught by the teacher

According to the class taught by the teacher shown in Table 1, the teaching process of folk music in each class is recorded respectively, with a total of five lessons recorded as a chapter of folk music teaching, lasting 200 min. During the recording, the four teachers taught the same content in each grade.

At this point, we can use the above content, the design of experimental data, as the research method of the diversity of national music classroom teaching technology

characteristics, the research object. Using three groups of research methods on the diversity of teaching technology characteristics of folk music classroom, this paper analyzes the diversity of teaching technology characteristics of four folk music teachers in the classroom.

3.2 Experimental Result

The First Group of Experimental Results

Based on the experimental data of this experiment, three groups of diversity research methods selected in this experiment are used to analyze the experimental data of this experiment design, which shows the diversity. In this group of experiments, in order to reduce the difficulty of the experiment, in this experiment, each teacher's grade is taken as a group. Statistics of three groups of diversity research methods, analysis of each teacher, teaching folk music classroom teaching technical characteristics of diversity time, the experimental results, as shown in Table 4.

Table 4. Analysis time of teaching technology diversity

Method	Teacher	Analysis time/s	Average time/s
Experimental group A	Teacher 1	1.6	1.50
	Teacher 2	1.2	
	Teacher 3	1.3	
	Teacher 4	1.9	
Experimental group B	Teacher 1	5.3	4.95
	Teacher 2	5.5	
	Teacher 3	4.2	
	Teacher 4	4.8	
Experimental group C	Teacher 1	11.3	10.85
	Teacher 2	11.6	
	Teacher 3	9.4	
	Teacher 4	11.1	

It can be seen from Table 4 that the average time required for each teacher in group C to teach the diversity of classroom teaching technical characteristics of ethnic music is 5.9 higher than that in group B and 9.35 higher than that in group A, and the time required to study the diversity of classroom teaching technical characteristics of ethnic music is the longest; The average time for each teacher in group B to teach the diversity of technical characteristics of folk music classroom teaching was 3.45 times higher than that in group A. Although the time needed to study the diversity of technical characteristics of folk music classroom teaching is better than that of experimental group B, it is lower

than that of experimental group A. It can be seen that it takes a short time to analyze the diversity of technical characteristics of folk music classroom teaching with the research method of diversity of technical characteristics of folk music classroom teaching.

The Second Group of Experimental Results

Based on the results of the first group of experiments, the second group of experiments is carried out to verify the three groups of methods and analyze the convergence performance of the diversity of the technical characteristics of folk music classroom teaching. Change the analysis time of the diversity of the technical characteristics of folk music classroom teaching, calculate three groups of methods to analyze the diversity error E of the technical characteristics of folk music classroom teaching. The calculation formula is as follows:

$$E = \frac{q}{Q} \times 100\% \quad (10)$$

(10) Where q is the result of diversity analysis; Q is the total number of technical features of folk music classroom teaching. At this time, MATLAB software is used to record the diversity of technical characteristics of folk music classroom teaching, view three groups of methods, and analyze the diversity error of technical characteristics of folk music classroom teaching. The changes over time are used to verify the convergence of the three sets of methods. The experimental results are shown in Fig. 1.

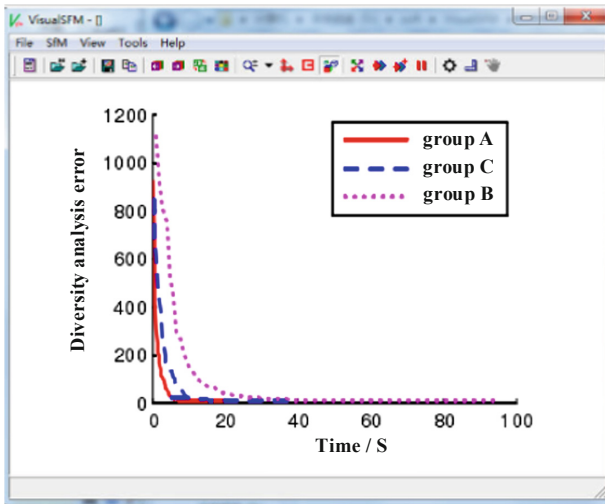


Fig. 1. Convergence performance comparison of three methods

As can be seen from Fig. 1, with the increase of time, the convergence performance of the three groups of methods to analyze the diversity of the technical characteristics of folk music classroom teaching, and the resulting analysis error have decreased to a certain extent. However, the convergence performance of group B is the worst. When

the time is close to 20 s, the data error remains stable and nearly zero; The experimental group A has the best convergence performance, and the analysis error converges rapidly within 0.5 s. It can be seen that the research method of the diversity of the technical characteristics of the national music classroom teaching in this study, the analysis of the diversity of the technical characteristics of the national music classroom teaching, the process is stable, and has a better convergence performance.

4 Conclusion

This paper studies the diversity of the technical characteristics of folk music classroom teaching methods, making full use of network knowledge sharing technology to judge the diversity of the technical characteristics of folk music classroom teaching. However, the diversity of research methods in this study did not consider the influence of students on the technical characteristics of folk music classroom teaching. Therefore, in the future research, we need to further study the student factors in the technical characteristics of folk music classroom teaching, further judge the technical characteristics of folk music classroom teaching, the diversity of subordinate, pay attention to individual differences, and pay attention to the diversification of evaluation indicators.

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