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Evaluation of Implantation Strategies for Integrating Drama Elements into Music Teaching from the Perspective of Educational Ecology

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Abstract: With the continuous expansion of music education, the theory about education ecology has a close relationship with the development of music education because of its novel and scientific viewpoints on nature, environment, ecology, etc. Therefore, many scholars regard educational ecological theory as an important research method. Judging from the current development of music teaching, there are many problems in the current music teaching, such as lack of culture, the disconnect between music education and real life, and the imbalance of music teaching methods. Based on this, from the perspective of education ecology, this paper proposed the rational application of dramatic elements to the music teaching model. The teaching quality was evaluated by data mining method to analyze the effectiveness of the method. At the same time, it can promote the promotion of drama culture, which is conducive to strengthening the inheritance of school drama culture and improving the school's sense of responsibility for the inheritance of drama culture. The experimental results showed that after the music teaching integrates the drama element, the music scores of the students were all above 85 points; the average score of the grade with the least improvement in music increased by 4.1 points, and the average score of the grade with the largest improvement increased by 10.4 points. It can be seen that the music teaching method with dramatic elements can significantly improve the students' music performance.

1. Introduction

For a long time, China has paid more and more attention to "ecological civilization" and

"sustainable development", and the sustainable development concept of ecological civilization has also become an important part of China's economic and social development. Music education occupies a pivotal position in China's education system, and it must conform to the current social and economic development trend. It needs to be sorted out again to explore its connotation. It also reflects on its role and influence in the overall development of human beings. The attention to its environment and the improvement of its educational ecosystem are a new breakthrough and growth point for the current and even the future. With the progress of the times, music education is also constantly developing, but it still lags far behind the times in the development of music education. At present, music education in ordinary primary and secondary schools is still based on a traditional educational concept and method, and the analysis and interpretation of music is only superficial. This goes against the social development system of "ecological civilization" and "sustainable development". From the perspective of educational ecology, the introduction of drama elements into music teaching has both practical significance and practical value. The dramatic element is a kind of dramatic work with special attributes, which contains three main factors. Therefore, a play contains many different dramatic elements. It can be both concrete and abstract, or it can be a specific person, event, time, place, etc. Modern technology such as Internet technology is gradually becoming the pioneer of the times. In the past, the evaluation of teaching quality was mainly carried out through observation, recording, etc. Now it is operated through various software, and it is more convenient in data processing. On this basis, it can effectively reduce the time spent by students in the evaluation process, thereby making the evaluation process more efficient and providing more opportunities for the improvement of teaching quality. This paper used data mining algorithm to verify the advantages of the integration of drama elements and music teaching. It not only aroused the enthusiasm of music teachers in teaching, but also continuously improved their own teaching ability through evaluation.

The innovation of this paper is to organically combine drama elements and music teaching, and strive to re-apply the theory to practice. It not only reforms the curriculum, but also puts forward some suggestions and countermeasures on how to build a music education curriculum with dramatic characteristics. By exploring new elements from the current teaching methods to adapt to the reform of the new curriculum, it brings new vitality to music teaching.

2. Related Work

In the field of music education, the academic community has a broader vision and deeper research on music teaching. Li S theoretically analyzed the importance of the combination of college vocal music education and traditional music culture, which not only pointed out some problems in the combination of traditional music culture and college vocal music education, but also gave an effective way [1]. Ma J was inspired by discussing the characteristics of Russian music teaching and applied it to Chinese music teaching. It was hoped that the Chinese music teaching can be reformed and optimized to improve the quality of Chinese music teaching [2]. Jeremi B studied the use of music technology software to enhance students' ability to learn music and the use of music technology software to facilitate their learning [3]. Yu C conducted an in-depth discussion and optimization of music teaching and network multimedia methods, and proposed a new way of good integration of media and music teaching [4]. In general, academic research on music education is multifaceted. The significance of teaching, the influencing factors of teaching, teaching content, and teaching methods are all involved. However, it is rare to analyze the integration of traditional elements of music teaching.

With the rapid development of data mining technology, educational data mining has received widespread attention in teaching quality evaluation as a new research hotspot. Xia X used four

different data classification techniques to collect and evaluate student music course datasets [5]. Xia Y established a teaching quality assessment system based on machine learning. This method can effectively solve the subjective factors existing in the evaluation of the evaluation object, and can obtain a better evaluation effect, so it has great application value [6]. Xiaofeng D proposed a design scheme for a music-assisted teaching system, which takes full advantage of the powerful functions, high cost performance, deep learning and artificial intelligence of smart chips. It has the advantages of global optimization, self-adaptation and rapidity, which enables the system to objectively and quantitatively evaluate the various performances of subjects [7]. To sum up, data mining technology is still widely used in music teaching evaluation. However, their algorithm research is relatively one-sided, and the methods used still need to be optimized.

3. Implantation of Dramatic Elements in Educational Ecology

3.1. Connotation of Ecological Music Education

The integration of ecology and education provides people with a new theoretical perspective and thinking method. It enables people to look at the world from a new perspective and gain a completely different understanding and experience from past experiences [8]. Music teaching is an organic whole, and its various components have ecological organic characteristics, such as the elements of teachers and students. It is a kind of existence with life. In music teaching, teachers and students are a kind of life, and it is a kind of music education activity with life characteristics. The development of music education is closely related to people's lives, and music education is closely related to real life, which gives it infinite vitality. In short, from the perspective of educational ecology, music teaching is an organic whole with living characteristics. Its vitality supports it and is the ultimate goal of its development. It is precisely because of its ecological characteristics that the ecological development of music education is possible [9]. Its educational ecological chain is shown in Figure 1.

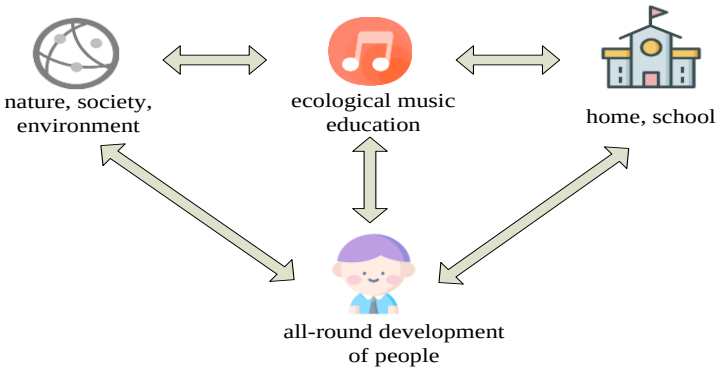


Figure 1. Music teaching ecological chain

In the music ecosystem, the physical environment and the human environment are the main components [10-11]. The physical environment is a prerequisite and foundation for music education. The human factor is the social environment in which the music classroom is located. In music teaching, teachers and students form an organic ecosystem, which provides a fixed space for music classrooms. In this kind of space, the exchange of information and emotion between teachers and students is an important part of the music classroom.

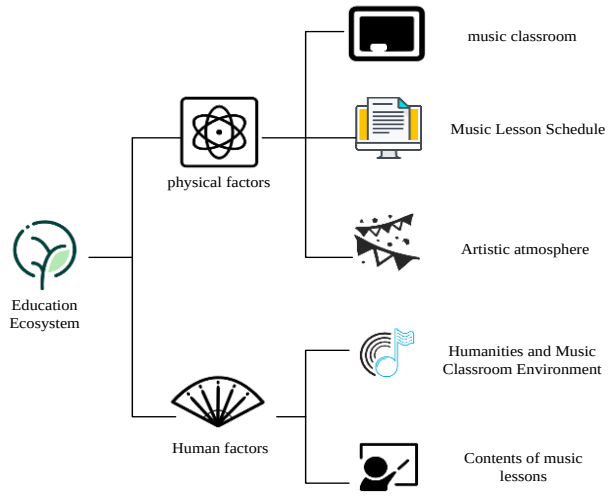


Figure 2. Components of a music teaching ecosystem

In Figure 2, the music education ecosystem mainly includes music classrooms, curriculum arrangements, and the school's art environment [12]. The music class is the main place where students learn music. In the classroom, there should be perfect and corresponding teaching equipment to give full play to the enthusiasm of students and improve their learning efficiency. In the music ecosystem, human factors mainly include two aspects: one is the humanistic classroom environment, and the other is the arrangement of music teaching content [13-14]. In music teaching, students should learn actively and follow the teacher's teaching method. Based on the teacher's teaching method, students come up with their own views and questions. Through the definition of the quality of music classroom teaching and the research on the quality of music teaching by scholars from all over the world, this paper has a deep understanding of the main factors affecting the quality of music teaching. By analyzing and refining it, a graph of factors affecting teachers' teaching quality is drawn as shown in Figure 3.

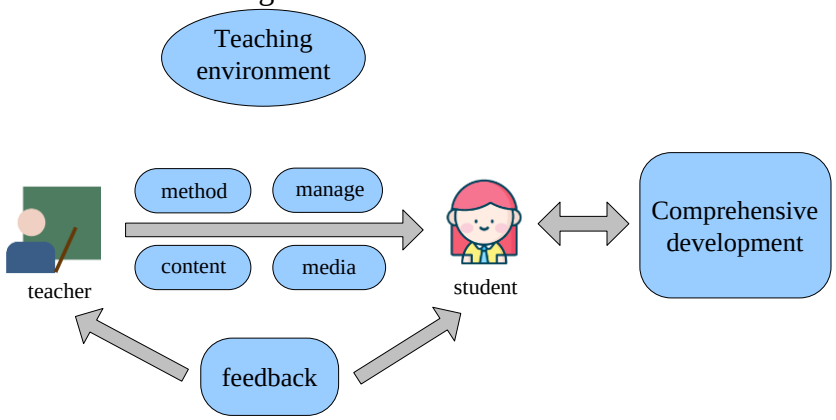


Figure 3. Main factors affecting the quality of music teaching

From Figure 3, it can be seen that methods and management are arranged on one side, while content and media are arranged on the other side. The main reason is that teachers can subjectively control methods and management, while teaching content and media technology exist objectively under certain time and conditions, which would not change due to teachers' subjective consciousness [15]. In practical teaching, no matter how many factors affect the quality of teaching, and how they relate to each other and influence each other, all aim at the all-round development of

students. Therefore, the introduction of drama elements in music teaching can improve students' interest in music and promote their artistic development.

3.2. Implantation Strategies for Integrating Drama Elements into Music Teaching

As a new teaching form with great potential and strong communication effect, implanted drama is an active, in-depth, flexible and permeable teaching method [16]. It can make music have a certain story, and easy to be accepted by students. At the same time, it also provides a way to inherit traditional drama culture. The implantation strategies of dramatic elements are mainly divided into several forms as shown in Figure 4.

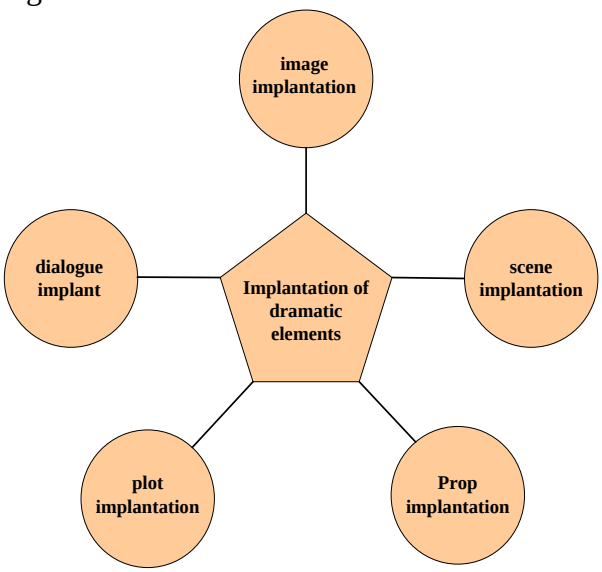


Figure 4. Value entry strategy for dramatic elements

It can be seen from Figure 4 that the implantation strategies for integrating drama elements into music teaching mainly include five forms: scene implantation, dialogue implantation, plot implantation, image implantation and prop implantation [17]. The implantation of scenes and plots is to simulate the physical scene created by the background of the music story during music teaching, so as to show the storyline through music. After the teaching of this method, it can be applied to the performance of music activities, which is somewhat similar to the form of stage musicals. Dialogue implantation in music teaching is to use the dialogue mode of singing and harmony to reflect the story of music, so that students can better understand the story behind the music. Implantation of images and props is to use students to perform role-playing in musical characters, and use stage props to enrich teaching methods. This method is lively and interesting, which can well mobilize students' enthusiasm for learning and make students enjoy fun in learning.

3.3. Evaluation of Music Teaching Development from the Perspective of Educational Ecology

In school music teaching, non-ecological phenomena are very common, but they are not static. Only by analyzing its phenomenon and taking corresponding measures can music education become a benign ecological environment. This paper took the music department of College A as an example, and conducted an in-depth investigation and analysis of the current situation of music teaching in this school. Students from 6 classes were selected from the freshmen and second grades to conduct a questionnaire survey. There were 319 students in total, and 310 questionnaires were returned. There were 35 music teachers in total, including 19 first-year teachers and 16 second-year teachers.

35 questionnaires were returned.

Table 1. Basic information of music teachers

Variable	Category	Number of people	The proportion
Age	20-30 years old	10	28.5%
	31-40 years old	17	48.6%
	Over 40 years old	8	22.9%
Education	College	8	22.9%
	Undergraduate	16	45.7%
	Master's degree and above	11	31.4%
Specialized	Vocal	16	45.7%
	Instrumental music	13	37.2%
	Other	6	17.1%

Table 1 provides basic information about music teachers. Most of the teachers of the music department are 20-30 and 31-40 years old, accounting for 28.5% and 48.6% respectively. Most of the teachers in these two age groups graduated from the music education department of normal colleges and are mainly engaged in the teaching of vocal music and instrumental music. Most of the in-service teachers have strong music training teaching experience and strong professional knowledge. In the face of this kind of music education reform, the teaching practice of on-the-job music teachers in colleges and universities is not so ideal in exploring the teaching practice of drama elements in the music textbooks currently used.

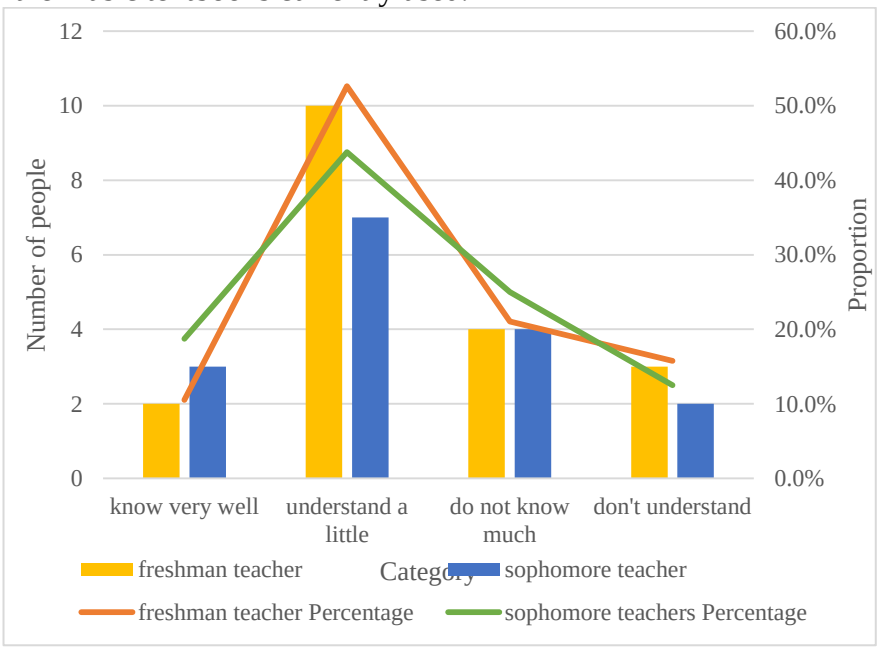


Figure 5. On whether teachers understand drama

From Figure 5, it can be seen that the proportions of freshman and sophomore music teachers who said they knew drama very well were 10.5% and 18.8% respectively. Nearly half of the first-year teachers said they only knew a little about drama, and 15.8% said they didn't know much about drama. It can be seen that the music teachers' drama knowledge is weak.

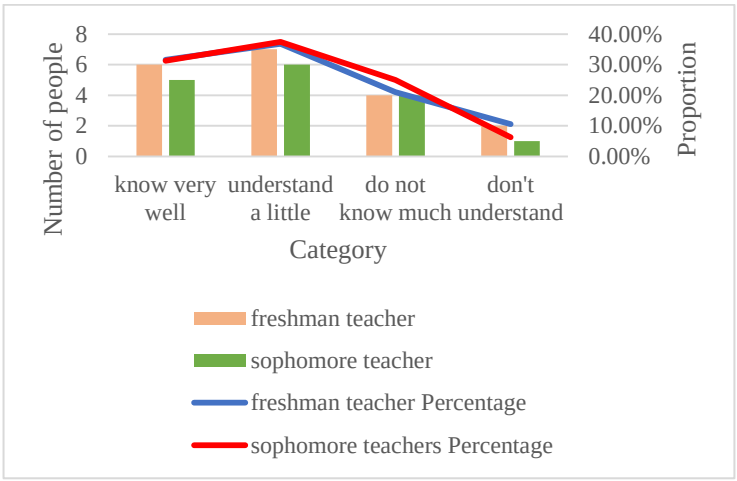
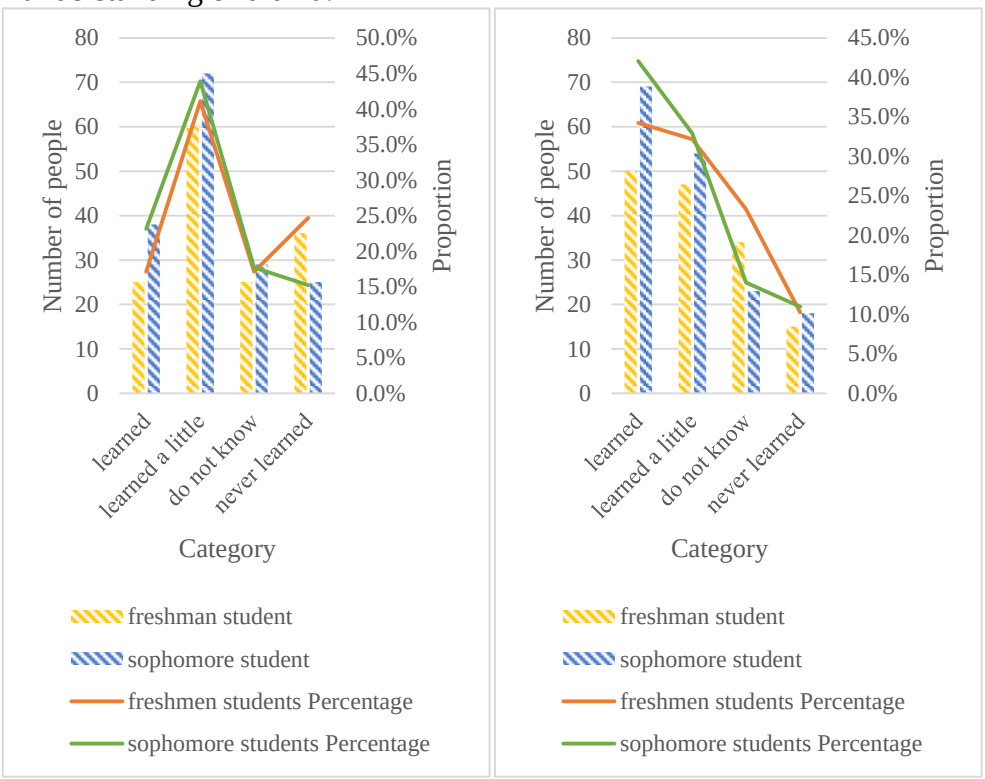


Figure 6. Whether teachers think music lessons are related to drama elements

From Figure 6, it can be seen that nearly 30% of the freshman and sophomore music teachers said that music lessons are still somewhat related to drama elements, and only about 10% of the music teachers said that music lessons have no relationship with drama. It can be seen that most music teachers are aware of the relationship between music lessons and dramatic elements. They believed that introducing drama elements into music teaching can stimulate students' enthusiasm for learning and make the classroom more interesting, but most teachers just use simple rhythms to express their understanding of drama.



(a) Whether drama has been studied in music lessons

(b) Whether students like music lessons with drama elements

Figure 7. Student questionnaire and analysis

From Figure 7(a), it can be seen that nearly half of the freshman students believed that they had learned or learned a little drama knowledge in music class, while 15.2% of sophomores said they had never learned drama knowledge in music class. There are drama elements in textbooks of all grades, but in the survey data of students, a large proportion of students said that they never appeared, which is enough to show that some teachers ignore the content of drama elements in teaching. It can be seen from Figure 7(b) that among the freshman and sophomore students, the majority of the students expressed their preference for the addition of drama elements in music lessons, and only a small number of students expressed dislike of the addition of drama elements in music lessons. Students who love drama have two characteristics, one of which is interest. Most students thought that it would be boring for teachers to teach them about music, but it would be even more interesting if some simple drama knowledge could be added. In the eyes of many people, music class is a relatively relaxed way of learning, but sometimes teachers pay too much attention to the rules, which can make them feel restrained. In music class, they can release their bodies to the fullest, because in the classroom, they can enjoy music to the fullest.

3.4. Music Teaching Data Mining and Evaluation

Music teaching data mining is the same as the traditional data mining method. Its data comes from a specific teaching system, and its goals are teaching management, teachers, students, parents, etc. Figure 8 can be used to illustrate the flow of educational data.

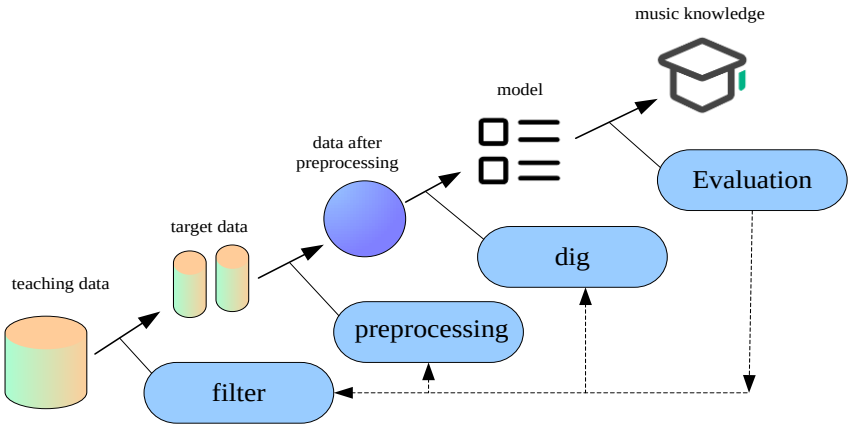


Figure 8. Music teaching data mining process

In music teaching, data collection is mainly extracted from teaching data. Data can be divided into teaching data, scientific research data, etc. By classifying and filtering the collected data, the target data is finally obtained, because the original data has problems such as noise, and the data format does not match the mining requirements.

Association rules

It is supposed that A is a teaching evaluation dataset, and B is a music teaching database. The B database contains m evaluation numbers, then the support S of m in B is expressed as:

$$S(m)=\frac{Count(A)}{B} \tag{1}$$

The rule support is:

$$M \Rightarrow N \tag{2}$$

M and N are both itemsets in the data set, then the ratio of the number of M and N evaluations in

the music teaching database to all indicators is expressed as:

$$S(M \Rightarrow N) \tag{3}$$

Among them, there are:

$$S(M \Rightarrow N) = \frac{Count(M \Rightarrow N)}{B} \tag{4}$$

The ratio of the reliability of itemset $M \Rightarrow N$ to the reliability of M is expressed as:

$$C(M \Rightarrow N) \tag{5}$$

Among them, there are:

$$C(M \Rightarrow N) = \frac{Count(M \Rightarrow N)}{Count(M)} = \frac{S(M \Rightarrow N)}{S(M)} \tag{6}$$

Among them, C stands for trust. The importance in the association rule represents the probability of N attributes appearing at the same time when the $M \Rightarrow N$ rule has M attributes, and the formula is:

$$\mathrm{Im}(M \Rightarrow N) \tag{7}$$

Among them, there are:

$$\mathrm{Im}(M \Rightarrow N) = \log \frac{P(N/M)}{P(N/notM)} \tag{8}$$

A simple example is used to illustrate the association rule data mining process. Table 1 is the database B of students' music study, which contains 6 transactions. "1" indicates that the element has been studied in music lessons, and "0" indicates that the element has not been studied.

Table 2. Student music learning content table

Tid	Vocal	Drama	Dance	Instrumental music
1	1	0	1	0
2	1	0	0	0
3	0	1	0	1
4	1	1	1	0
5	1	1	0	0
6	1	1	1	1

From Table 2, it can be concluded that the itemset M={vocal, drama, dance, instrumental music}, and vocal and drama appeared the most. The curriculum included a total of 6 elements, of which elements 1, 2, 4, 5, and 6 included vocal music, and there were 5 types in total; affairs 4, 5, and 6 included both vocal music and drama, and there were 3 types in total. Therefore, support was calculated as 0.5, and reliability was calculated as 0.6. If the minimum support $\alpha = 0.5$ and the minimum reliability $\beta = 0.6$ were set, it was considered that there is a relationship between vocal music and drama. This conclusion also showed that it is feasible to apply dramatic elements to music teaching.

(1) Outlier mining algorithm

The outlier mining method is a common mining method, which can be well applied to the

evaluation of teaching quality in the field of education. This paper applied it to the teaching quality evaluation after the drama elements are integrated into music teaching, in order to test the effectiveness of the method. Its algorithm formula is expressed as:

$$P(x)=\frac{1}{m}\sum_{j=1}^{m} f\left(x_{ij}\right) \tag{9}$$

Among them, m represents the dimension of music teaching evaluation, and $f\left(x_{ij}\right)$ is the frequency of the j-th type of evaluation result of x_i. However, when this method is directly applied to teaching evaluation data, the accuracy is not high enough, so the outlier detection algorithm is improved. It is supposed that A_i is an evaluation index in the music teaching data set, and x and y are two different values of A_i. q is a subset of the dataset, and q_i is the complement of q. $P_i(q/x)$ is the probability that A_i occurs when the q subset is x, and $P_i(q_i/y)$ is the probability that A_i occurs when the q subset is y, then the distance between the x and y values of A_i is expressed as:

$$\beta^{ij}(x,y)=P_i(q/x)+P_i(q_i/y) \tag{10}$$

Among them, the value of $P_i(q/x)$ and $P_i(q_i/y)$ is $[0,1]$, and then $\beta^{ij}(x,y)$ is expressed as:

$$\beta^{ij}(x,y)=P_i(q/x)+P_i(q_i/y)\text{-}1 \tag{11}$$

It is assumed that the music teaching data set has k evaluation indicators, then the distance between any two x and y values is expressed as:

$$\beta(x,y)=\frac{1}{m}\sum_{j=1\ldots m}^{i\neq j}\beta^{ij}(x,y) \tag{12}$$

This method can effectively distinguish the difference between different attributes under the same attribute. Based on two different types of cosine similarity, the similarity calculation formula is as:

$$S(x,y)=\cos(x,y)=\frac{\vec{x}\cdot\vec{y}}{\|x\|*\|y\|} \tag{13}$$

In Formula (13), the cosine similarity ranges from -1 to 1.

(2) Fuzzy comprehensive evaluation method

It is assumed that the fuzzy evaluation model is composed of evaluation index set $\mathrm{M}=\{m_1,m_2,m_3,\ldots m_n\}$, teaching evaluation set $P=\{p_1,p_2,\ldots p_n\}$ and teaching evaluation matrix Y, then the subset Q of the weight of each teaching evaluation index on the M set is expressed as:

$$Q=(q_1,q_2,\ldots,q_i) \tag{14}$$

In Formula (14), q_i is the weight of the i-th teaching evaluation index, and there are:

$$\sum_{i=1}^{m} q_i=1 \tag{15}$$

It is supposed that the evaluation of the i-th evaluation index is the fuzzy relationship between the M index set and the P evaluation set is $Y_i(y_{i1}, y_{i2},..., y_{in})$, then the evaluation matrix of the m teaching indicators is:

$$Y = \overset{m}{\underset{i=1}{Y}} Y_i = (y_{ij})_{m\times n} \tag{16}$$

Therefore, the result formula of the comprehensive evaluation is:

$$E = Q \bullet Y = (e_1, e_2,..., e_n) \tag{17}$$

It is a $m\times n$ matrix that is a subset of the judgment set. Therefore, according to the relationship between each index, the index relationship table shown in Table 3 can be divided and constructed.

Table 3. Indicator relationship table

Serial number	Evaluation indicators	Weights
1	t_1	q_1
2	t_2	q_2
3	t_3	q_3
4	t_4	q_4
5	t_5	q_5

Finally, the evaluation value of each level is analyzed through the index relationship table, and then the final comprehensive evaluation score of music teaching is obtained according to $e_i(i = 1,2,...,n)$ of the comprehensive evaluation result:

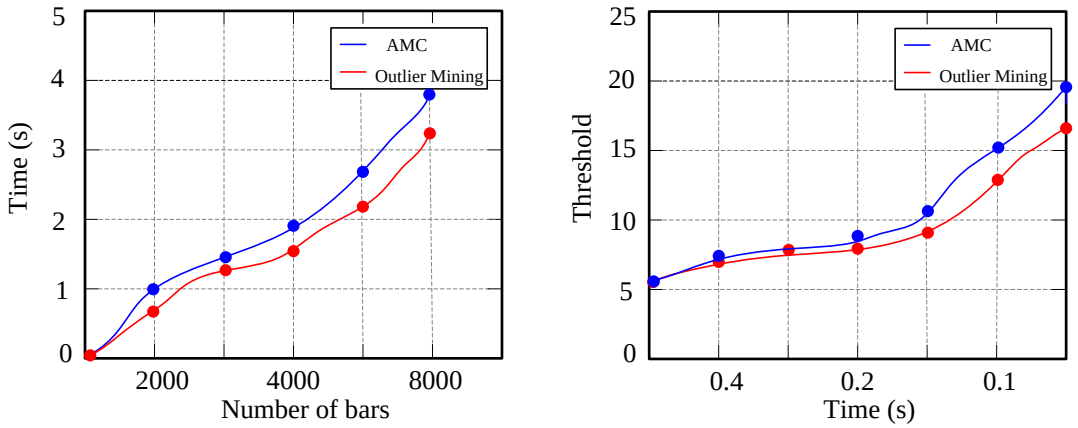
$$H = E \bullet G^Y \tag{18}$$

Among them, E is the comprehensive evaluation result matrix of teaching; G is the rating vector.

4. Music Teaching Data Mining Experiment

4.1. Algorithm Efficiency Test Results

In order to verify the effectiveness and efficiency of the algorithm, the performance of the outlier mining algorithm proposed in this paper and the traditional Adaptive Modulation Coding (AMC) algorithm were compared through experiments. The data of a university's music education evaluation in 2020 was used, including 15,000 teaching evaluation records. Figure 9 is a comparison of the operation time of the two methods under different data processing conditions and under different support thresholds.



(a) Comparison of running time with different data sizes

(b) Relationship between running time and minimum support threshold

Figure 9. Comparison of the efficiency of the two algorithms

Figure 9(a) compares the running time of the algorithm under different data sizes. When the minimum support threshold was 0.1 and the data volume changed gradually from 1000 data to 8000 data, the running time of the AMC algorithm was compared with the calculation results of the outlier mining algorithm. The results showed that when the minimum support threshold, the algorithm was faster than the AMC algorithm; with the growth of data, the superiority of the computational efficiency became more and more significant. Figure 9(b) compares the minimum support threshold of AMC and the outlier algorithm when given 15,000 teaching data. When the amount of data was the same, the outlier algorithm outperformed AMC, and its superiority became more significant as the minimum support threshold decreases. The method proposed in this paper can effectively solve the fusion of dramatic elements in music teaching, thus effectively avoiding unnecessary cohesion operations.

4.2. Integrating Drama Elements into Music Teaching

This paper again selected 30 teachers and 150 students from the music department of the A college for investigation and analysis. After integrating drama elements into music teaching, music teachers and students' attitudes towards learning were counted to analyze the effectiveness of the strategy of drama element implantation.

Table 4. Teacher and student survey satisfaction

Evaluation	Student number	Proportion of students	Teacher number	Proportion of teacher
Very satisfied	74	49.3%	10	33.3%
More satisfied	51	34%	15	50%
Not so satisfied	15	10%	2	6.7%
Dissatisfied	10	6.7%	3	10%

From the data in Table 4, it can be seen that more than half of the students were satisfied with the integration of drama elements into music teaching, and only a small number of students were dissatisfied with the integration measures. 50% of teachers were satisfied with the integration of drama elements into music teaching, and 30% of teachers were very satisfied with this. It can be

seen that the implantation strategy of drama elements was relatively successful.

Finally, the scores of students in the four grades of the school (out of 100 points) were selected to analyze the music score data of students before and after the integration of drama elements into music teaching.

Table 5. Scores before and after the integration of dramatic elements

Grade	Pre-integration average	Average score after integration	Average lift score
Freshman	86.5	90.6	4.1
Sophomore	79.6	86.2	6.6
Junior year	81.2	88.4	7.2
Senior year	74.9	85.3	10.4

From the data in Table 5, it can be seen that after the integration of drama elements, the average score of freshman students' music scores increased from 86.5 to 90.6; the average score increased by 4.1 points, which was the least improved among the four grades. Among them, the students with the largest score improvement were seniors, which increased from 74.9 points to 85.3 points; the average score increased by 10.4 points. After music teaching is integrated with drama elements, the average score of all grades was above 85. Therefore, the integration of drama elements into music teaching is conducive to improving students' interest in music learning, and also helps to improve students' music performance.

5. Conclusion

This paper discussed the problems existing in the current music teaching from the perspective of educational ecology. On this basis, this paper proposed a specific implantation strategy for integrating drama elements into music teaching. At the same time, this paper also analyzed the music teaching evaluation data, and proposed a method based on outlier detection. By using this method to analyze the actual teaching evaluation of A college, some implicit information was found, which provided a basis for the work of teaching administrators and teachers. Experiments have verified that the teaching mode combining drama elements with music subjects has demonstrated its operability and effectiveness in actual music teaching. At present, the introduction of drama elements in music teaching creates a good environment for cultivating well-rounded students. However, due to the limitation of research time, this paper has some shortcomings. There are many kinds of data mining algorithms at present, so it needs to be further optimized and improved to improve its operation efficiency.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

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