Research on the Application of Multimedia Technology in Junior High School Music Classrooms

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Abstract. Music education is an important part of quality education in our country. Music education is an important way to improve people's comprehensive culture and artistic accomplishment, and an important means to promote our music development. In the process of junior high school music teaching, the author found that the traditional junior high school music teaching model has been unable to adapt to the development of The Times, the junior high school music education model needs to be innovative. Nowadays, with the continuous update of science and technology and the rapid development of multimedia education technology, traditional music education should be combined with modern multimedia education technology. This study mainly finds out the factors that influence the effect of multimedia educational technology in junior middle school music education, and improves the SVM Algorithm, and establishes the I-P-O analysis framework.

Keywords: music education · junior high school education · multimedia technology · teaching effect

1 Introduction

With the reform of the new curriculum standard and the continuous development of quality education, junior high school education pays more attention to students' morality [1]. The study of music course has been paid more attention. Music teaching can help students calm down and listen to works, promote students' physical and mental development, and cultivate students' interests in music learning [2]. However, in traditional music courses, the teacher is the dominant person who instills boring music knowledge, and students seldom listen to it [4]. In addition, due to the long-term influence of exam-oriented education, music is not paid much attention by schools. Near the mid-term and final exams, music courses will be occupied by other subjects, resulting in students' low enthusiasm for music learning [5]. Therefore, in the process of teaching, junior high school teachers integrate multimedia technology into music courses, which can enrich the teaching mode and innovate the teaching content, to attract the attention of junior high school students in class, stimulate students' learning interest and improve the efficiency of classroom learning.

2 Factors Influencing the Effect of Multimedia Educational Technology.

2.1 Educational Resources

Are the basis of multimedia education and the important factors that affect the effect of multimedia education [3].

2.2 Teachers' Application Ability

Whether teachers can reasonably use multimedia education technology affects the effect of multimedia education technology [5].

2.3 Student

As the direct receiver of education, students directly affect the effect of multimedia educational technology [8].

2.4 SVM Algorithm

The purpose of the SVM algorithm training is to find the two largest extreme hyperplanes at the two ends of the separating surface associated with the decision function. That is, to find the support vector of the training set, which accounts for a small percentage of the entire training set, which is the sparsity of the support vector. According to the sparsity of support vectors, the data set can be divided into chunks, and SVM training is performed on each small data block, and then the support vectors of each small data block are lumped together. The set of support vectors sought is then chunked to find new support vectors. The iteration stops with the condition that the global optimal support vector is found. This chunking method shortens the training time without compromising the SVM algorithm's accuracy. The new optimization problem will reduce the size of the original problem's objective function, bringing it closer to the original problem and allowing it to be solved more accurately. The subproblem of this method can be solved by an analytical approach, which in turn speeds up the solution rate of the original problem. The sequence minimum optimization algorithm, which selects a working set with only two elements, has the following mathematical expressions.

$$
\min_{\alpha^{(*)} \in R^{2l}} \frac{1}{2} \sum_{i,j=1}^{l} \left(\alpha_i^* - \alpha_i\right)\left(\alpha_j^* - \alpha_j\right)\left(\Phi(x_i) \cdot \Phi(x_j)\right)
$$
$$
+ \varepsilon \sum_{i=1}^{l} \left(\alpha_i^* + \alpha_i\right) - \sum_{i=1}^{l} y_i\left(\alpha_i^* - \alpha_i\right)
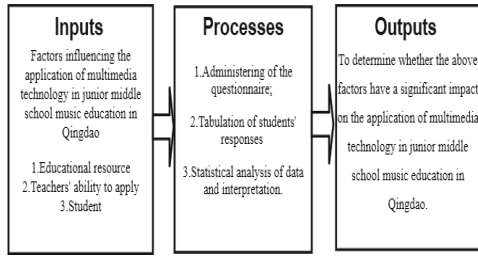$$

(1)

Fig. 1. Analytical framework

3 Establish an Analytical Framework and Improved SVM Algorithm

3.1 Establish an Analytical Framework

Based on the I-P-O model, this study establishes an analytical framework for the application effect of multimedia educational technology in music education (Fig. 1). This study will use the analytical framework process for experimental and data analysis.

3.2 Improved SVM Algorithm

There are only two variables to solve (positive and negative), and the size of the working set has been reduced to a minimum. According to the characteristics of support vector machine algorithm, the proportion of support vector in the training data is very small, so the data can be divided into blocks, and training each data block is the process of eliminating all non-support vector [7]. Since the support vector machine solves the global optimal process, the support vector finally obtained is the global optimal support vector. First, the training data was divided into M copies in principle. The M copies of each layer were used as independent SVM blocks for training. Then all the support vectors in this layer are merd, and block training is carried out for the obtained support vectors in this layer.

In this study, SVM Algorithm is used to establish a two-level analysis system for the quality of multimedia technology application in music teachers (Fig. 2).

The advantage of this approach is that it trains different blocks of data during iteration, gradually eliminating nonsupport vectors to arrive at the final support vectors. The number of support vectors in each layer gradually decreases, allowing many support vectors to be retrieved while maintaining accuracy. Moreover, the cut of the dataset can
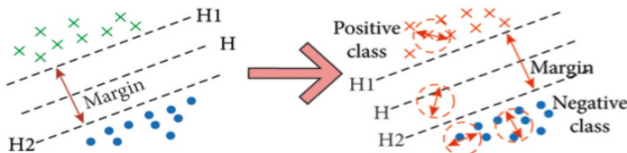

Fig. 2. Improved SVM Algorithm

be manually controlled to provide a guarantee for the scalability of large datasets and increasing the threshold value further ensures the accuracy of our algorithm. And supervising the change of support vectors in each layer makes the loop that does not satisfy the condition terminated. The cascaded SVM parallel regression algorithm mainly chunks the large sample data and finds its corresponding support vectors separately.

4   Data Analysis

In this study, 300 questionnaires were distributed to teachers in Qingdao, China. The questionnaire consisted of two parts: the first part was the basic information of teachers, and the second part was the factors affecting the effect of multimedia technology, which was presented in the form of 5-point Likert scale. In this study, SPSSAU and SVM Algorithm was used to analyze the data.

5   Survey Results of the Effectiveness of Multimedia Technology Application in Music Teaching

To explore the factors influencing the effect of applying multimedia technology in junior middle school music teaching in Qingdao city, a survey was carried out on teachers' attitude towards applying multimedia technology, their ability to apply multimedia technology, student factors and educational resources factors, and the statistical results of mean value and standard deviation were obtained.

According to Table 1, all three factors have a significant effect of applying multimedia technology in junior middle school music teaching in Qingdao city.

5.1   Teachers' Ability to Apply Multimedia Technology in Music Teaching is not High

It can be seen from the Table 2 that the IT ability of primary and secondary school teachers is at the average level (M = 3.014). In terms of teachers' ability to apply multimedia technology, subject teachers' ability to search teaching resources, make teaching resources, use technology to present information, ability as cognitive tool, ability as interactive tool, and ability as evaluation tool are investigated. The ability of music teacher to use multimedia technology in different dimensions is as follows: Resource search (3.48) > Present information (3.40) > Cognitive tools (3.08) > Interactive tools (2.98) > resource making (2.60) > evaluation tools (2.53).

Table 1. Descriptive statistical analysis of influencing factors

	Mean	Std.
teachers' application ability	3.0	0.522
Student factor	3.1	0.581
Educational resources	4.2	0.730

Table 2. Descriptive statistics of teachers' ability to use multimedia

	Mean	Std.	Variance
Resource search capability	3.48	0.764	0.584
Resource production capability	2.61	0.746	0.557
The ability of media to present information	3.40	0.796	0.634
Ability as a cognitive tool	3.08	0.781	0.611
Ability as an interactive tool	2.98	0.719	0.517
Ability as an evaluation tool	2.53	0.662	0.438

According to the questionnaire statistics, 18% of teachers are proficient in using multimedia technology, 52% are not proficient, and 30% are not proficient.

5.2 Teachers Lack the Ability to Use Multimedia Technology with Students as the Main Body in Music Class

Through classroom observation and questionnaire survey, it is found that only 10% of classrooms can realize the in-depth application of multimedia technology with students as the main body, 24% of teachers can occasionally use multimedia technology with students as the main body to assist teaching, and 66% of teachers cannot use multimedia technology with students as the main body to assist teaching. The analysis shows that there is some deviation between teachers' cognition of the application level of multimedia technology and the actual level, and the actual level is slightly lower than the teachers' self-cognition level.

5.3 Music Multimedia Education Resources Are Lacking

According to classroom observation and questionnaire survey, only 30% teachers think that there are sufficient multimedia resources in music class, 45% teachers think that multimedia resources in music class are not enough, and 25% teachers think that multimedia resources in music class are completely insufficient.

5.4 Gender Difference Analysis of Multimedia Technology Application in Junior Middle School Music Classroom

The survey objects included teachers of different genders, and the differences were analyzed from the perspective of gender. Here, it was assumed that the collected data had a certain continuity. SPSSAU was used to test the homogeneity of variance and the significance of difference between the two groups of data. If the variance of the two samples is homogenous, the test of mean significance difference is used. If the two samples have inconsistent variances, the calibration formula of mean comparison is used to test.

Table 3. Analysis of gender difference.

Factors	Gender	M	Std	t	p
Teachers' application ability	Male	3.12	0.49	-3.279	0.001
	Female	2.93	0.63		
Student factor	Male	3.20	0.69	-2.735	0.007
	Female	3.00	0.68		
Educational Resources	Male	3.42	0.49	-2.546	0.011
	Female	3.25	0.38		

According to Table 3, male music teachers in junior high school are better than female music teachers in multimedia application attitude, multimedia application ability, student-oriented and access to educational resources.

Teachers' application ability (Male 3.12 > Female 2.93), Student factor (Male 3.20 > Female 3.00), Educational Resources (Male 3.42 > Female 3.25).

6 Junior High School Music Teaching and Application of Multimedia Information Technology

6.1 Improve the Integration of Traditional Education and Multimedia Education

In the music teaching of junior high schools, to reflect the advantages and effects of multimedia information technology, schools should improve the integration level of teachers' traditional education and multimedia teaching [9].

6.2 Choose the Best Education Method Based on the Psychological Characteristics of Junior High School Students

Based on the multimedia information technology education model, teachers should not only pay attention to the innovation of education model, but also choose the best teaching method around the psychological characteristics of junior high school students, to show the advantages of multimedia information technology and cultivate the good music literacy of junior high school students [10].

6.3 Enrich Music Education Resources and Create Multiple Educational Situations

In the junior high school music teaching work, teachers should use multimedia information technology to enrich music education resources and create diversified music education contexts [6].

7　Conclusion

This study establishes an analytical framework for analyzing the application effect of multimedia technology in junior high school music education, Analyze and conclude in junior high school music teaching, and some suggestions were made.

References

1. Shen, C. W., & Ho, J. T. (2020). Technology-enhanced learning in higher education: A bibliometric analysis with latent semantic approach. Computers in Human Behavior, 104, 106177.
2. Al-Qaysi, N., Mohamad-Nordin, N., & Al- Emran, M. (2021). Factors affecting the adoption of social media in higher education: a systematic review of the technology acceptance model. Recent advances in intelligent systems and smart applications, 571–584.
3. Hicken, L. K., & Duke, R. A. (2023). Differences in Attention Allocation in Relation to Music Teacher Experience and Expertise. Journal of Research in Music Education, 70(4), 369-384.
4. Luo, W. (2023). Online distance music teaching platform based on Internet Plus. International Journal of Information and Communication Technology, 22(1), 73-88.
5. Yang, Y. (2022). Assessing alignment between curriculum standards and teachers' instructional practices in China's school music education. Research Studies in Music Education, 1321103X221099852.
6. Jordan, R. C. (2022). A Student-Led, Small-Group Approach to a cappella Music Arranging. Music Educators Journal, 108(3), 47-55.
7. Shi, J., & Ning, Q. (2022). Research on the Innovation of Music Teaching in Universities Based on Artificial Intelligence Technology. Security and Communication Networks, 2022.
8. V. W., Jiang, Z., & Xie, K. (2022). Teachers' exposure to professional development and the quality of their instructional technology use: The mediating role of teachers' value and ability beliefs. Journal of Research on Technology in Education, 54(2), 188-204.
9. Zhang, L. (2022). Integration of Information Technology into Music Education to Cultivate Creative Thinking Among Middle School Students. Journal of Contemporary Educational Research, 6(1), 93-98.
10. Ho, W. C. (2022). Perceptions of values and influential sources of creativity, music types, and music activities in school music learning: a study of students in Changsha, China. Music Education Research, 24(1), 1-17.