

RESEARCH ON THE INTEGRATION STRATEGY OF MUSIC TEACHING AND ENVIRONMENTAL EDUCATION UNDER THE PERSPECTIVE OF ECOLOGICAL CIVILIZATION

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ABSTRACT

With the gradual deterioration of today's ecological environment, there is an urgent need to improve the quality of environmental education. The current environmental education has grown somewhat with the increase in government investment. However older teaching methods seem inadequate to deal with the current situation. The integration of music teaching into environmental education, as explored in this paper, can be a good solution to this problem. This fun and educational approach is a good way to enhance students' interest in learning. After the corresponding discussion on the value of integration, the article used hierarchical analysis to conduct a fuzzy comprehensive evaluation of the combined utility. After stratifying the corresponding influencing factors, the weights were assigned and satisfactory evaluation results were obtained. An example was used for the analysis in this paper. The results showed that third graders with appropriate education got a significant improvement in their scores than sixth graders with no education. Both their median and mean scores improved from 66 and 60 to 70, respectively. More students are also concentrated in the high-score segment. In terms of the direction of focus, the percentages of the four areas of saving food, saving water, saving electricity, and separating garbage all changed. The values of the corresponding numbers for the third and sixth grades are 29%, 20%, 23%, 28% and 29%, 15%, 21%, 35%, respectively.

KEYWORDS

Ecological environment; environmental education; music teaching; integration value; comprehensive evaluation.

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1. INTRODUCTION

In the present time of rapid social development, the lack of material life has been gradually solved [1-3]. However, it is a very troubling problem how to solve the deteriorating ecological environment around us. Raising people's awareness of environmental protection can better help us alleviate the increasingly severe environmental dilemma [4,5]. In recent years, the level of quality education in China has been improving year by year. It is an important task to better penetrate the concept of environmental protection into the students' minds. The current ecological environment, such as emissions, wastewater discharge, and other issues directly affects our lives [6-8]. Correspondingly, our investment in this part of education has been strengthened. However, it is not enough to use environmental education only as a means of propaganda, which does not achieve our ultimate goal [9-11]. From an educational point of view, unlike other traditional disciplines, environmental protection education is not limited to a discipline [12-14]. This advantage shows that it is possible to combine and integrate it with any discipline. Among these, the music classroom has shown its great advantages [15,16]. In this regard, many scholars have conducted research at various levels.

Brennan M [17] investigated whether music communities in Scottish communities can address environmental protection issues. The project examined how music festival communities are constructed, with the focused dimension of concern being how music festivals can help address environmental issues. Using a variety of research methods, the researcher asked members of the music community about their perceptions of environmental protection and obtained positive results. Batt-Rawden KB [18] conducted a study of music as a quality of environmental intervention in a Norwegian system of welfare institutions. The survey was conducted at a local medical center, where subgroups of people were surveyed for their cultural situation. During a two-day passive observation, it was found that the use of music as a beneficial aspect of environmental intervention increased among the students. This is a testament to the tremendous effect that occurs when the two are integrated. After the 2018 Global Climate Risk Index ranked Haiti as a country with extreme weather, scholarly research in various countries concluded that the planet is in a dangerous state of imbalance. Dirksen R [19] investigated the efficacy of using musical means to develop environmental awareness, focusing on how human responsibility for the environment is expressed interactively through song. Publicover JL [20] investigated whether adding an artistic element can add a certain emotional component to environmental education. He argued that environmental education is a key tool in human efforts to address environmental issues and that the arts can help provide some of the emotional components of environmental education. After studying a group of environmentally conscious musicians, the results were coded and analyzed. The analysis revealed four artistic dimensions and five qualitative dimensions that participants considered when sharing their environmental values through music. Qiang G [21] investigated the role of music itself in ecological influence and transmission. He argued that the trend of the times has led to the diversified

development of various musical cultures and that this development can be applied to ecological theories. He also analyzed the current ecological problems in China based on the ecological development theory. m. Prior H. [22] was keenly aware of the power of music. Music is often used to help solve specific problems, especially in the areas of health and well-being. The issue of climate change is increasingly established in public discourse, but individuals often fail to act in environmentally friendly ways. In the field of environmental psychology, a number of empirically based theories have been developed. Focusing on a selection of relevant theories, he attempts to identify the role that music plays in influencing beliefs and behaviors related to the environment. In light of the current ecological posture, it makes sense to integrate music instruction into environmental education [23-25]. In order to survive and thrive in the long run, it is important to focus part of education on environmental protection. It is possible to use music classes to teach environmental conservation. This is because the teachers themselves can incorporate some of the characteristics of music teaching in the music classroom to protect the environment. In addition, it is possible to use the psychological characteristics of the students to select suitable environmental protection themes to add to the lesson plan. In a relaxed and cheerful atmosphere, students are not learning environmental protection knowledge in boring text teaching. The relaxed atmosphere of music teaching with music can allow more environmental protection knowledge to permeate to students and make them enhance their own environmental protection awareness while communicating and learning about music [26,27]. Specifically, we can try to incorporate many songs about environmental protection into music teaching materials. When teachers are conducting lessons, they should not only confine themselves to teaching the text but should also convey this context to their students. In addition, it makes sense to incorporate environmental awareness into diverse musical activities. For example, when a teacher teaches a unit of music knowledge, he or she can design a drama based on the content of the song and let students perform it in their own preferred way [28,29]. This can not only stimulate the interest in learning music knowledge but also make students understand the importance of protecting the environment in a more immersive way.

In the current environment, the issue of environmental protection has been a point that cannot be ignored more and more. Environmental protection education is also something that should be invested more [30]. At this stage of the music classroom, a corresponding combination of environmental protection knowledge can make students understand the importance of protecting the environment to a greater extent. This is of great significance for today's environmental education. This paper discusses in detail the specific value of the integration of the two, discussing their effectiveness using a fuzzy integrated evaluation of the utility of hierarchical analysis. It is hoped that the effectiveness of the integration can be verified by using concrete examples to enhance environmental education.

2. THE VALUE OF INTEGRATING MUSIC TEACHING WITH ENVIRONMENTAL EDUCATION

2.1. IMPROVE THE EFFECTIVENESS OF CLASSROOM TEACHING

Integrating environmental awareness into music teaching can help improve the impact of music teaching in the classroom. In elementary school music classes, the teacher's classroom teaching affects the effectiveness of students' music classroom learning and thus the quality of classroom teaching [31]. Meanwhile, teachers should focus on students in music teaching to promote effective development of music teaching and ensure students' mastery of music knowledge. Teachers combine music content with real-life environmental awareness to carry out elementary school music lessons in depth, improve the quality of classroom music lessons, enhance students' classroom learning effects, comprehensively cultivate students' basic music quality, and improve students' music appreciation ability.

2.2. SUBLIMATION OF STUDENTS' EMOTIONS

By showing students images, audio, video, and environmental behaviors from everyday life, teachers present students with musical compositions that allow them to interact with the music and sublimate their emotions. When conducting elementary music instruction, teachers provide music content that should enhance students' interest in teaching music in the classroom. Under the influence of traditional techno-economic conditions, the form of music instruction is individualized and fails to convey rich musical content to students, leaving them unable to feel the beauty of music. Therefore, teachers should use daily exposure to show students representative music classics, use new methods of presentation to increase interest in teaching appreciation and motivate students to actively participate in music appreciation activities.

2.3. IMPROVE STUDENTS' HANDS-ON SKILLS

Empty cans, used newspapers and other recyclable trash are common in students' daily lives. By creating and transforming these items in music class, students can turn them into treasures and create more fun for them. For example, teachers can ask students to add different amounts of sand to different empty cans and then seal the filler plugs with tape so they can turn the used cans into new percussion instruments. Allowing students to play their instruments in class gives them mental satisfaction. In addition, teachers can allow students to scatter their ideas through their own creations by transforming their household scraps into various decorative items for performance, which not only effectively improves students' practical skills, but also helps to raise their environmental awareness. The three values brought by integrating music

teaching and environmental education are described in Figure 1. The three values are the improvement of teaching effectiveness, the sublimation of students' emotions, and the better development of students' practical skills.

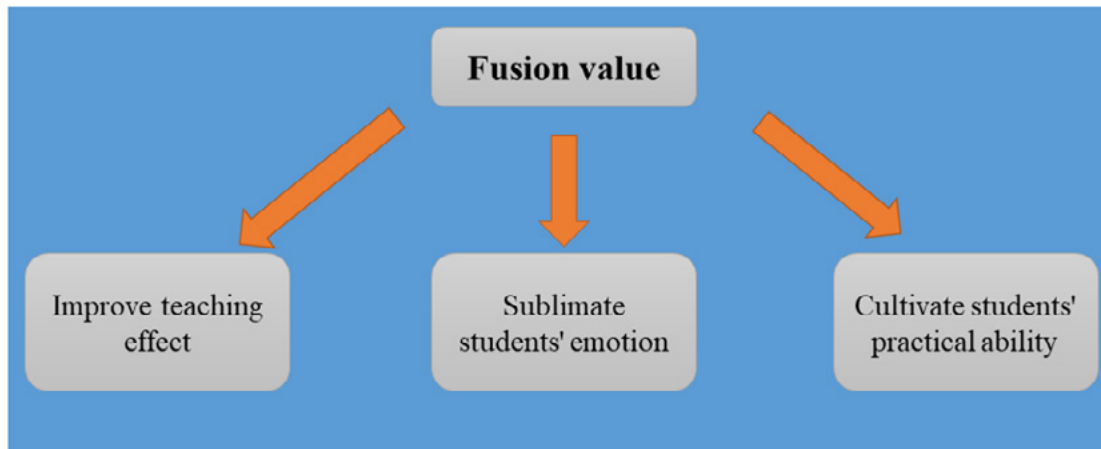


Figure 1. The value of integrating music teaching and environmental education

3. STRATEGIES FOR THE EFFECTIVE INTEGRATION OF MUSIC TEACHING AND ENVIRONMENTAL EDUCATION

3.1. CREATE A MUSIC-TEACHING ATMOSPHERE

Teachers should incorporate environmental knowledge to create a positive classroom atmosphere. In music classes, teachers can use multimedia to teach students or show pictures or videos related to music content and environmental knowledge to stimulate students' senses, so that they can actively learn music knowledge and meet the needs of classroom music learning. In music classroom teaching, teachers should pay attention to the subjective learning nature of students, so that students have initiative in learning, thinking, exploring, and reflecting, and encourage students to realize their emotions effectively in their work to improve the classroom effect [32]. For example, when appreciating music related to the suburbs, teachers can show students videos or images that teach them the concept of "going out" and suggest ways to be more environmentally conscious when leaving, such as cleaning up trash. Since students are usually from urban areas and are not familiar with the concept of suburbia, teachers can show them videos or images related to suburbia so that they can better understand the concept of "suburbia" and avoid misunderstandings due to lack of life experience or experience and lay the foundation for students to deeply understand the emotions inherent in the relevant works. In addition, teachers can ask students questions to better integrate this teaching context. What recreational activities can I do in the suburbs? What should I do after the recreational activities are over? What do we do if we see recyclable trash in the suburbs? and have students answer this question, allowing them to enter a fun and

powerful teaching atmosphere with the teacher's guidance so that the overall teaching effectiveness is greatly enhanced. In particular, it puts students in a happy learning atmosphere. Because the teacher can use the visual effects of the video to teach the students, it enhances their musical experience and improves their learning in the classroom.

3.2. ENRICH THE CONTENT OF MUSIC TEACHING

In music classes, teachers should dig deeper into the content of music materials, enrich classroom teaching with the help of environmental knowledge, strengthen the close connection with music students' lives, and enhance the cultivation of music quality and ability. First, enjoy nature, from infection to care. Teachers can combine multimedia modern tools with teaching materials to let children enjoy natural landscapes and appreciate the beauty of natural and artificial environments under the influence of a lot of audiovisual information so that students can care about their world and habitat. Learn about the impact of human activities on the environment and show the landscape through songs. Second, appreciate the work and understand it from the perception. It has an important impact on the development of children's musical aesthetics and environmental awareness. Teachers can use a variety of methods to apply to the explanation process. This allows children to feel the beauty of the natural and human environment while providing them with a deep understanding of the negative effects of environmental destruction. Everyone on the planet must care about the world and the place we live in, bridging the gap between people and nature and making them interact with each other. At the same time, teachers must constantly update classroom content to improve students' basic music quality. In music classes, teachers should pay attention to music culture, make students aware of various musical instruments, and improve their artistic qualities. By developing environmental awareness and enriching classroom content and modes, students' understanding of music and musical content can be deepened [33,34]. By continuously studying the musical knowledge in the textbook, teachers can help students understand the connotations and abstract concepts of musical culture more easily and accurately, and develop environmental awareness more easily. On the basis of improving students' music appreciation ability and cultivating their self-confidence in music learning, attention should be paid to improving the learning efficiency of students' music classes. Teachers should make full use of the music classroom to deepen students' understanding of environmental protection, deepen their absorption of environmental knowledge, and allow students to appreciate the charm of music education and teaching combined with the protection of the environment.

3.3. OPEN UP THE SECOND CLASSROOM

We can use the music class time to open up the second classroom and change the situation of "sitting and listening" in the classroom so that students can "come out". Translate environmental awareness into environmental protection measures and

improve students' environmental performance. Elementary and middle school students often have a wealth of knowledge but need to learn more deeply and extensively. Teachers should encourage students to conduct more outdoor investigations and enhance environmental education through extracurricular activities.

If you live with pollution, everyone is a victim, but on the other hand, anyone can be a destroyer of the environment. So encourage students to do small environmental tasks every day, things like whether the classroom is clean or has no messy waste and domestic wastewater disposal. Students should be taught that they should work as a family to protect the environment and change their existing habits. They should also promote green consumption and use cloth bags when going to the supermarket to reduce white pollution. Garbage as another kind of wealth, set up a garbage sorting area and recycle cans and plastic bottles in order to turn waste into treasure. When traveling, one should travel in a civilized manner so as not to pollute picturesque places. Establishing an environmental association for students can enable them to participate in an organized way to protect the environment, such as collecting white trash on campus. If there is a traffic jam, then parents can be encouraged to turn off the engine and wait, because if the traffic jam is prolonged, the car cannot burn completely and the exhaust gases can directly harm the people around the road. We can't just talk about theory, but we must put environmental protection into practice every time. Students will understand that "environmental protection is everyone's responsibility" is not just a slogan, but also a way for every citizen to follow orders. Young people can lead the whole society and promote social participation in environmental protection. Figure 2 illustrates the progression of students' environmental awareness. Through these sessions, the student's participation in environmental protection follows the state of "can protect the environment" - "want to protect the environment" - "will protect the environment" - "adhere to environmental protection" change. From the exhortation to build on the basis of good development of self-confidence, we have the motivation to protect the environment, then we find ways to protect the environment, environmental protection into our own habits, and finally to form a firm will and perseverance.

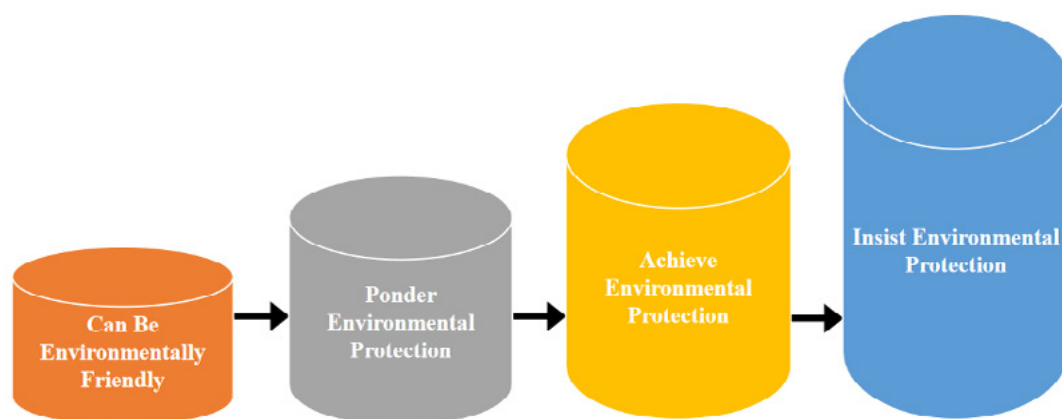


Figure 2. Progressive process of students' environmental awareness

4. FUZZY COMPREHENSIVE EVALUATION OF THE UTILITY OF MUSIC TEACHING AND ENVIRONMENTAL EDUCATION

4.1. EVALUATION INDEX SYSTEM FOR THE UTILITY OF INTEGRATING MUSIC TEACHING INTO ENVIRONMENTAL EDUCATION

Referring to relevant literature, 10 utility factors affecting music teaching and environmental education were analyzed using hierarchical analysis. The first factor was musical ability enhancement. This is specified as the assessment of students' musical ability through a vocal test, which is rated by the teacher after identification. The second factor is the improvement of environmental awareness. The specific content is the use of small games to assess students' environmental cognitive ability, and the content is mainly simple environmental knowledge. The third factor is students' satisfaction with the classroom-. The specific content is the distribution of questionnaires to find out the students' satisfaction with the classroom. The fourth factor is the execution of the teacher's teaching. The main content is to randomly check the classroom to find out the active atmosphere and students' motivation. The fifth factor is the increase in the number of teachers, and the main content is to count the number of music teachers in the school. The sixth factor is the increase in classroom teaching tools. The specific content is to count the tools and money invested by teachers in conducting music teaching. The seventh factor was the richness of the classroom content. The specific content is the classroom content of the class by distributing questionnaires. The eighth factor is students' satisfaction with the teacher. This is done by distributing questionnaires to students to rate the teaching style of the teacher. The ninth factor is the students' attraction to the course content. The ninth factor was the attractiveness of the content of the music class to the students. The last factor was the length of the lesson, which was determined by asking the instructor for the length of the lesson.

These indicators were divided into 2 orders and 3 levels to assess the utility of music teaching and environmental education in four aspects: students' perceptions of their own abilities, reliability of teaching, teaching expenditures, and overall quality of teaching. The finalized evaluation index system for the utility of music teaching integrated into environmental education is shown in Figure 3.

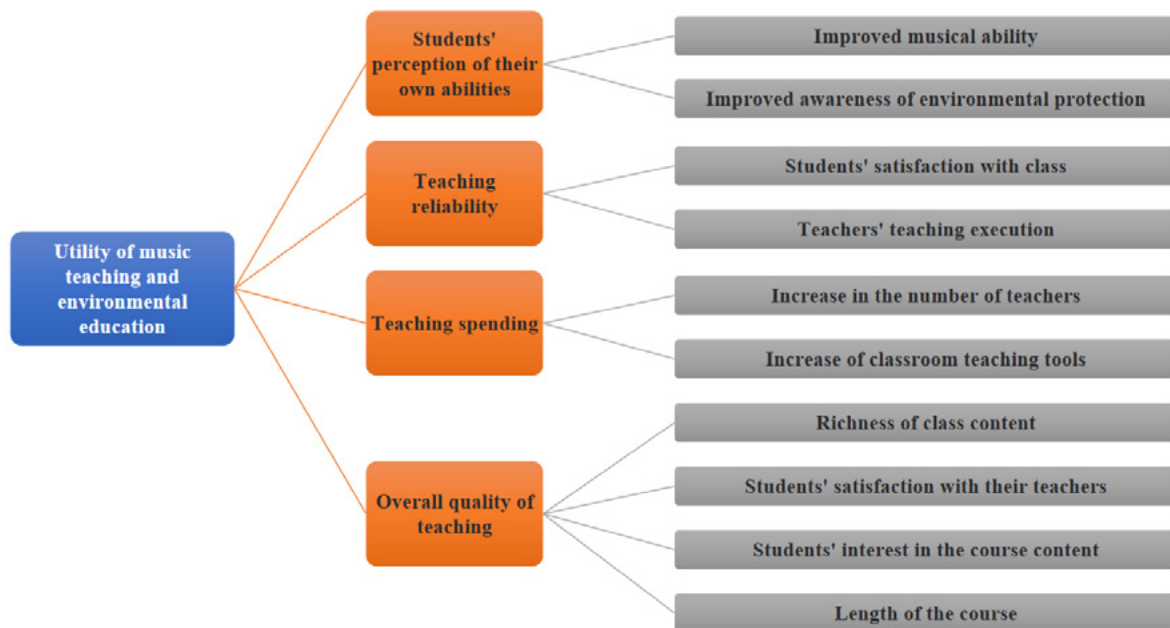


Figure 3. Evaluation index system of the utility of integrating music teaching in environmental education

4.2. FUZZY COMPREHENSIVE EVALUATION OF THE UTILITY OF COMBINING MUSIC TEACHING AND ENVIRONMENTAL EDUCATION

Firstly, for the weights of indicators at all levels of this teaching, the hierarchical analysis method was used to analyze and calculate them. By reading other literature and referring to the weights of each indicator of the indicator system developed by other scholars, the weights of rating indicators for the utility of combining music teaching with environmental education were finally determined as shown in Table 1. The weight value of each indicator is based on the importance of each item in the indicator evaluation system in teaching and the data from the comprehensive survey of teachers and students.

Table 1. Evaluation index weights of the utility of combining music teaching and environmental education

Target layer	Weighting of primary indicators	Secondary indicator weights
The utility of music teaching and environmental education (U)	Students' perceptions of their own abilities (0.43)	Music ability improvement (0.42)
		Enhancement of environmental awareness (0.58)
	Reliability of teaching (0.22)	Students' satisfaction with the classroom (0.37)
		Execution of teachers' teaching (0.63)
	Teaching expenses (0.09)	Increase in the number of teachers (0.25)
		Increase in classroom teaching tools (0.75)
	Overall quality of teaching (0.26)	Richness of classroom content (0.31)
		Students' satisfaction with teachers (0.24)
		Students' level of attraction to the course content (0.19)
		Duration of the course (0.26)

The weight vector matrix can be derived as follows, respectively

$$A_1 = (0.42, 0.58) \quad (1)$$

$$A_2 = (0.37, 0.63) \quad (2)$$

$$A_3 = (0.25, 0.75) \quad (3)$$

$$A_4 = (0.31, 0.24, 0.19, 0.26) \quad (4)$$

In order to construct an evaluation affiliation matrix, 253 students were invited to evaluate the utility of music teaching and environmental education teaching according to the utility evaluation system of combining music teaching and environmental education in Table 1 by distributing questionnaires online and offline, and according to five equal ratings of very dissatisfied, dissatisfied, half, satisfied, and very satisfied. According to statistics, 253 questionnaires were distributed and 217 valid questionnaires were collected, with a valid recovery rate of 85.77%. Through the statistics of the evaluation results, the evaluation affiliation matrix of the utility of combining music teaching and environmental education can be obtained.

$$R_1 = \begin{pmatrix} 0.067 & 0.095 & 0.127 & 0.297 & 0.348 \\ 0.098 & 0.049 & 0.081 & 0.422 & 0.335 \end{pmatrix} \quad (5)$$

$$R_2 = \begin{pmatrix} 0.052 & 0.112 & 0.037 & 0.362 & 0.359 \\ 0.067 & 0.075 & 0.098 & 0.397 & 0.388 \end{pmatrix} \quad (6)$$

$$R_3 = \begin{pmatrix} 0.066 & 0.123 & 0.159 & 0.243 & 0.407 \\ 0.092 & 0.064 & 0.035 & 0.350 & 0.398 \end{pmatrix} \quad (7)$$

$$R_4 = \begin{pmatrix} 0.073 & 0.064 & 0.123 & 0.447 & 0.496 \\ 0.111 & 0.085 & 0.061 & 0.452 & 0.364 \\ 0.090 & 0.052 & 0.135 & 0.472 & 0.348 \\ 0.042 & 0.048 & 0.103 & 0.535 & 0.331 \end{pmatrix} \quad (8)$$

To perform the first-level fuzzy evaluation, the model $M(\cdot, +)$ is used for the synthetic operation, and the results of the first-level fuzzy evaluation are obtained as follows.

$$B_1 = A_1 \wedge R_1 = (0.054, 0.098, 0.082, 0.405, 0.362) \quad (9)$$

The same reasoning leads to:

$$B_2 = (0.082, 0.079, 0.017, 0.364, 0.358) \quad (10)$$

$$B_3 = (0.061, 0.064, 0.116, 0.362, 0.379) \quad (11)$$

$$B_4 = (0.121, 0.107, 0.157, 0.307, 1.308) \quad (12)$$

Subsequently, the second-level fuzzy evaluation was carried out, and the same model $M(-, +)$ was used for the synthetic operation to obtain the results of the second-level fuzzy evaluation.

$$B = A \wedge R = (0.111, 0.107, 0.154, 0.317, 0.309) \quad (13)$$

The fuzzy evaluation result is calculated, and the fuzzy vector is further mono-valued, and each evaluation level in the evaluation domain is assigned as $V-1=1$, $V-2=2$, $V-3=3$, $V-4=4$, and $V-5=5$. The final weight values of the five sets of comments are analyzed, which are 0.117, 0.101, 0.144, 0.308, and 0.315. The highest weight value (0.315) in the five sets of comments, combined with the rule of maximum affiliation, shows that the final comprehensive evaluation result is "satisfactory". This shows that the effectiveness of music teaching and environmental protection is significant.

5. SPECIFIC EXAMPLE ANALYSIS

5.1. COMPREHENSIVE SCORE COMPARISON ANALYSIS

In the fourth section of the fuzzy comprehensive evaluation, a hierarchical analysis was used to assign weights in a stratified manner, and a final satisfactory result was obtained. After this, after communication and consultation, this paper applied the

integration of music teaching and environmental education to a third-grade student for one semester. Questionnaires were distributed to parents to understand the students' environmental awareness focus while having the current students compete with the sixth graders in an environmental awareness knowledge contest. In this quiz, there are 45 students in both the third and sixth grades. This paper reflects on the gap in environmental awareness between the students who have received the integration strategy of music teaching and environmental education and the average students.

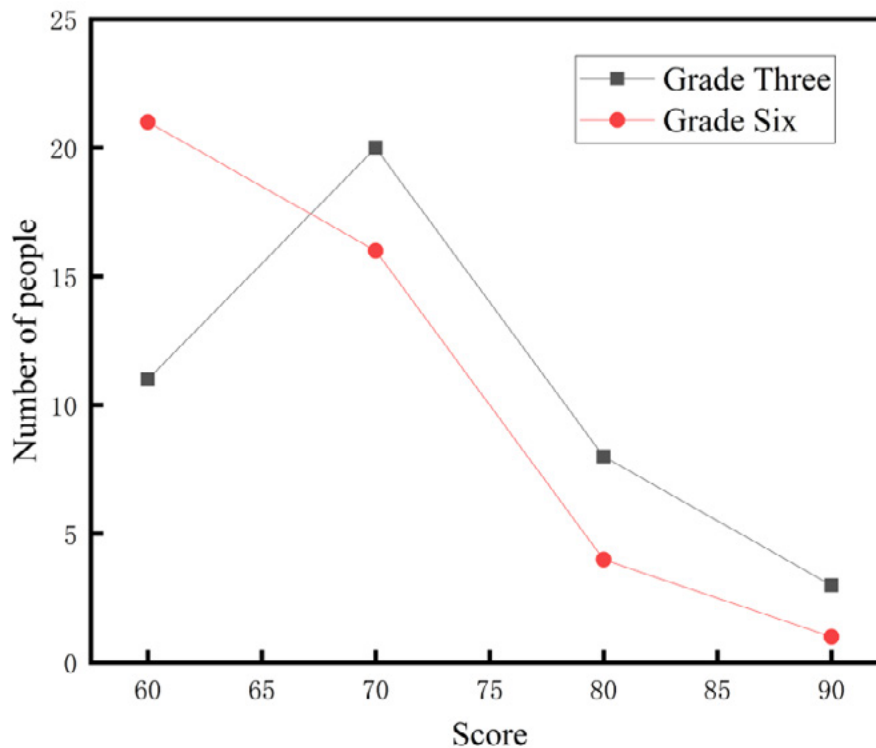


Figure 4. Number of scores in each section of the knowledge contest

In Figure 4, an exhaustive comparison of the number of scores in each segment of the knowledge competition is presented for both grades. In general, the general trend in the overall scores for both ages is a high number of students in the low-scoring range and a low number in the high-scoring range. However, the majority of the sixth graders, who did not have an integrated education, were concentrated in the 60 and 70-point range. The majority of the third graders who had the appropriate education were in the 70 and 80 range. The difference between the two reflects the overall improvement in the quality of the students. Within the high scoring range of 80 to 90, the number of third graders is also much greater than the number of sixth graders. In terms of specific values, the overall median and mean scores of third graders who have received music integration education also improved compared to sixth grade. This is a significant increase from 60 and 66 to 70. The number of low scores in the third grade has been reduced compared to the sixth grade, thanks to the adaptation of teaching strategies. More numbers are gradually moving towards the higher end of the scale. Although the overall improvement is not drastic, it is important to understand that this comparison was made between two different grade levels. There

is still a large difference in learning ability between the two grade levels. If the strategy was applied to all grades, I believe the sixth grade would have scored higher in the competition. This shows how effective it is to combine music instruction with environmental education. Elementary school is the beginning of quality education when students are in a state of mind and values to be shaped. At this time, better educational strategies can be useful in shaping students' values. Therefore, providing students with a way to combine music and environmental education at this stage is a good way to ingrain environmental values in their minds. This approach is necessary in today's environment, which is deteriorating. In addition, the results of the knowledge competition also showed that the speed of knowledge reserve is not divided into age groups. Younger students can also quickly form a knowledge system with appropriate training. Therefore, this once again confirms that the cultivation of environmental protection knowledge should be as early as possible.

5.2. FOCUS ON DIRECTION ANALYSIS

Another issue is reflected in Figure 5 for the two grades' environmental awareness focus. The chart shows that the third grade has the following environmental emphasis from the largest to the smallest: saving food, saving water, saving electricity, and separating garbage. The overall trend is also consistent for the sixth grade. In terms of the percentage of people, the percentages of people who associate environmental protection with these four dimensions in third grade are 29%, 20%, 23%, and 28%, respectively. In grade 6, the percentages were 29%, 15%, 21%, and 35%, respectively, from the largest to the smallest. Although the trend of the two is close, the overall level of third graders is improving from the median and average. From these two points, it can be seen that after the integration of music teaching and environmental education teaching, the third-grade students have a higher number of students focusing on each point. The sixth graders, on the other hand, had a significantly lower focus on trash sorting than the other three points. This is largely due to the fact that the conservation of basic resources and the protection of the ecology have been deeply rooted in the past. However, there is a lack of awareness of waste separation as a means to protect the ecological environment and conserve resources, which has emerged in recent years. This again demonstrates how well the teaching of new integration strategies can impart current advanced environmental concepts to students. In today's ecological environment, many environmental issues are gradually coming to the forefront. Issues such as metal pollution, offshore oil spills, etc. are all issues that need attention. The integration of these topical environmental issues into today's music teaching can better shape the values of students. This is a great help for the subsequent quality education in China to train students who have the right values to protect the environment.

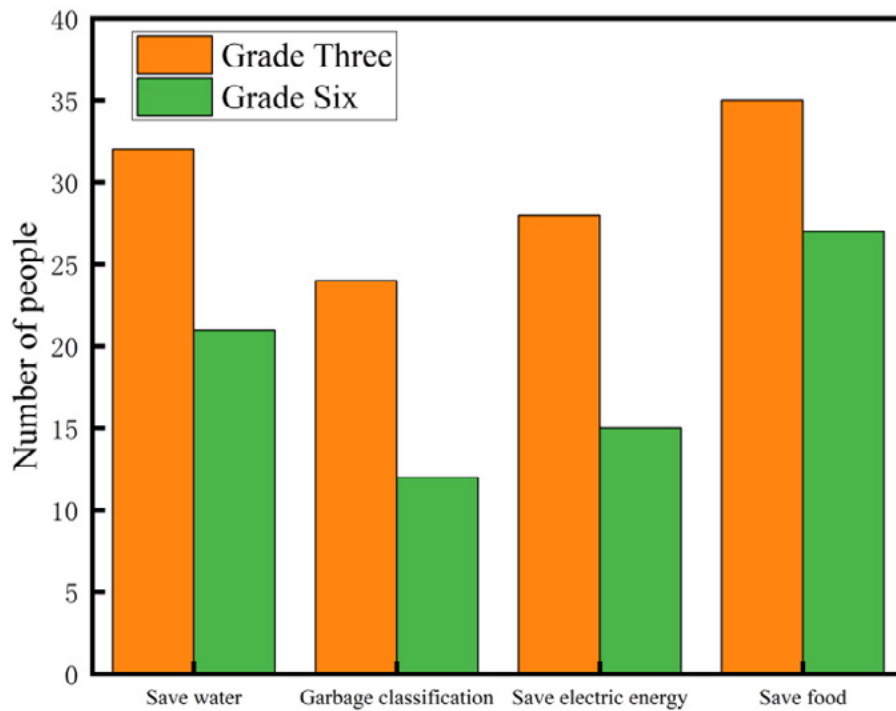


Figure 5. Environmental awareness focus

6. DISCUSSION

Research on the integration strategies of music teaching and environmental education in the context of ecological civilization has been conducted at different levels both at home and abroad. Quality education for the protection of the ecological environment can be said to have been developed early in China. The protection of water resources, the greening of the environment, and so on have been long-standing observations in students' textbooks. However, with the development of the times, both the students and the educational environment have changed significantly. It is not helpful to use old educational strategies for environmental education. Music teaching, like the one mentioned in this article, is a new educational vehicle. However, it is not limited to the combination of new educational methods with music teaching. Other methods that can effectively stimulate students' interest and make them aware of new environmental protection methods and situations should be promoted. In today's world of technology and educational thinking, good environmental education methods should be constantly proposed.

7. CONCLUSION

This paper analyzes the research on how to develop strategies for integrating music teaching and environmental education in the context of ecological civilization. After a background introduction to the study, the paper describes the value of integrating music teaching and environmental education accordingly. After that, a

fuzzy comprehensive evaluation study of the effectiveness of combining music teaching and environmental education was conducted to obtain the results of integrating the two with significant efficacy. Subsequently, the teaching approach was applied to a third-grade student. After this, the students of this time were put into an environmental awareness knowledge contest with the sixth-grade students and the following results were obtained.

1. In the analysis of the number of scores in each segment of the knowledge contest, the third-grade students who were taught the integration strategy scored higher overall than the sixth-grade students who were not taught it. The majority of the third-grade students scored in the 70 to 80 range, with 68% of the scores. Sixth graders scored mostly in the 60 to 70 range, with 89% of the scores.
2. In the specific analysis of the scores, the mean scores of the third grade have improved significantly. In terms of median scores, the median scores for the sixth and third grades were 60 and 70, respectively, but in terms of specific trends, both showed a gradual decrease in the number of high scores. In both cases, the majority of the scores are concentrated in the 60s and 70s.
3. In the description of the environmental awareness focus of the two grades, the distribution of the focus from major to minor was the same in both grades. From the largest to the smallest, they are: saving food, saving water, saving electricity, and separating garbage. However, the specific percentages of the two differ. For the third graders, the percentages were more even, 29%, 20%, 23%, and 28%, respectively. The sixth graders, on the other hand, focused less on the level of waste conservation. The percentages of the four items were 29%, 15%, 21%, and 35%, respectively.

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